B/W Controls™

LIQUID LEVEL TECHNOLOGY

Ordering Guide & Technical Information

Continuous & Point Liquid Level Sensors

ABSOLUTE PROCESS CONTROL
KNOW WHERE YOU ARE... REGARDLESS

AMETEK®

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FROM its inception in 1933, BIW Controls was on the leading edge of liquid level control. It all started with BIW's original idea of taking advantage of the electrical conductivity of most liquids to achieve floatless level control. Since then the idea has earned worldwide acceptance as the most reliable and versatile system of its kind. It has been utilized throughout such industries as the food, beverage, dairy, pharmaceutical, and chemical processing industries; in municipal waterworks and sewage treatment plants; and for numerous other commercial and industrial applications where close, constant control or monitoring of liquids and/or moist bulk materials is crucial.

The many advantages of conductivity liquid level control systems over conventional mechanical control devices are readily apparent:

- Because there are no moving parts in the liquid the many problems typically encountered when using mechanical equipment with linkages and so forth are entirely eliminated.
- Installation is easy, there is virtually no maintenance. It has a long and trouble-free life. It is safe, accurate, and reliable.
- Its operational efficiency is impervious to fluctuations in pressure, temperature, turbulence, or consistency of the liquid.
- Moreover, since the relays we supply are always matched in sensitivity to the specific resistance of the liquid to be controlled, our systems are adaptable to most applications requiring control or monitoring of liquid or semi-solids.

Ametek has added to the BIW Controls brand of point level controls to include the use of our unique, patented magnetostrictive sensor technology for precise continuous liquid level sensing. Many thousands of these sensors are used around the world in such areas as petroleum, chemical, food, beverage, and other industries.

In addition to providing these magnetostrictive probes to the OEM market, various end user focused probes are available. Easy to use analog probes are available for both shallow and deep tank applications. Accurate measurement with resolution to 0.01" is standard. These units feature the Stik™ technology with a loop powered 4-20mA communication and an intrinsically safe hazardous area approval. Analog probes are available in meither a rigid design up to 24' or flexible up to 40'. A Modbus RTU probe is available in an explosion proof design which provides multivariate measurements for total level, interface and temperature measurement from a single sensor. An OEM version probe with digital communication allows for resolution to 0.0001", multivariate measurements with up to 5 temperature zone measurements.

Ametek has the design experience you need and is eager to work on your unique design needs. Should you require engineering assistance or need application information, our sales engineers are only a phone call away. Call us direct or contact the BIW Controls distributor nearest to you.

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Series 1500
Induction Relays

THE SERIES 1500 INDUCTION RELAY *WITH FIELD CONVERTIBLE CONTACTS* PROVIDES A VERSATILE AND RELIABLE LIQUID LEVEL CONTROL

APPLICATION

As the pioneer producer of electrode-activated floatless level control systems, we acquired broad, practical experience in developing and manufacturing equipment to meet the requirements of a wide range of liquid level applications.

The Series 1500 Induction Relays provide versatile and economical means of controlling many processing and production functions from remote locations with the safety inherent in a low energy sensing circuit that is isolated from the AC power source.

Installed near pumps, motors or other operating equipment, the Series 1500 Induction Relay permits use of low-cost light gauge wires for the control circuit to level sensing electrodes. Relays with low voltage secondary coils provide remote control up to 36,000 feet from contact type pilot devices.

Available as open chassis units or furnished factory mounted in a choice of standard or special enclosures, these relays are connected to a constant source of alternating current. When properly installed, they will draw a maximum of 9 volt-amperes regardless of the line or electrode circuit voltage.

FEATURES

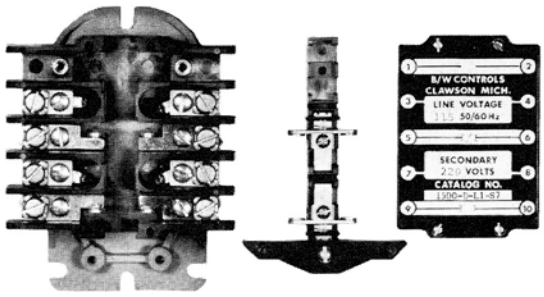
The 1500 Series Induction Relay, not only retains the high quality and durability of the Series 1100 Induction Relay, but also provides these important features.

- **Available with 1, 2 or 3 isolated double break contacts**
- **Contacts can be added in the field**
- **Contact arrangement can be added or changed in the field from N.O. to N.C. or N.C. to N.O.**
- **All terminals are completely accessible and have #8 pan head screws with captivated wire clamp**
- **All contacts rated 25 AMP at 120V or 240VAC**

CONTACT RATINGS
25 Amp Resistive at 120, 240, or 480 VAC
1 HP Single Phase at 120 or 240 VAC
Heavy Duty Pilot 120 to 600 VAC
2 Amp Resistive at 120 VDC
10 Amp Resistive at 48 VDC

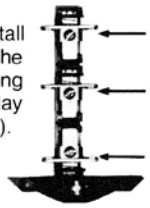
CIRCUIT VERSATILITY

The Series 1500 Induction Relay can have contacts easily added and/or changed from N.O. to N.C. or N.C. to N.O.



Remove cover plate and armature

For a N.O. contact, install the moveable contact in the armature assembly facing toward the top of the relay (away from the armature).



For a N.C. contact, install the moveable contact in the armature assembly facing toward the bottom of the relay (toward the armature).

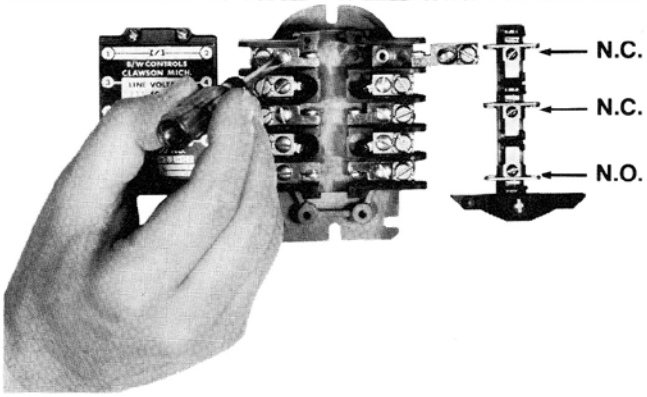
N.O. CONTACT

For a N.O. contact, install the stationary contacts facing toward the bottom of the relay (toward the armature).

N.C. CONTACT

For a N.C. contact, install the stationary contacts facing toward the top of the relay (away from the armature).

Replacement Contact #15-000001



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PRINCIPLE OF OPERATION

A floatless liquid level control system consists of a relay of the proper type, a holder designed to support one or more electrodes or probes in the liquid container.

The corrosion resistant electrodes for all B|W induction relays are quite similar, differing only in contact arrangement.

As shown in diagrams below, the laminated core of the relay is **H** shaped. The primary coil is assembled to the upper bar of the core, and the secondary coil for the electrode is placed on the lower bar. An armature located below the legs of the **H** core is connected to an insulated arm carrying the movable contacts. When the armature is raised, these contacts close or open the motor and electrode circuits, depending upon whether the contacts are normally open or closed. (Contacts shown normally open in this example.)

When a source of alternating current is connected to the primary coil at terminals 3 and 4, the primary coil sets up a magnetic flux which — following the lines of least resistance — circulates through the shortest path. As shown in Figure 1, this is through the lower bar of the laminated core on which the secondary coil is mounted. This magnetic flux induces a voltage in the secondary or electrode circuit coil. No current can flow in this coil, however, until the circuit is completed between the electrodes. **Thus, the electrode circuit voltage being generated within the relay has no connection with the power line.**

The B|W 1500 induction relay utilizes the liquid as an electrical conductor to complete the secondary circuit between the upper and lower electrodes. Thus, when the liquid contacts the upper electrode, the resulting flow of current in this circuit sets up a bucking action in the lower bar of the core. This action tends to divert lines of magnetic force to the core legs and sets up an attraction that pulls the armature into contact with the legs, as shown in Figure 2. This armature movement closes the electrode and load contacts.

The lower contacts on 1500-C Relays (terminals 9 and 10) connect the secondary circuit to ground when liquid contacts the upper electrode and act as a holding circuit to maintain the relay in its closed position until the liquid falls below the lower electrode. This holding circuit provides control of the relay over any desired range in the liquid level, depending on the distance between the upper and lower electrodes.

The flow of current through the low energy secondary circuit is very small and varies with the voltage of the secondary coil. The secondary coil is selected to operate over the resistance of the liquid being controlled. Accordingly, since there is a wide range of secondary coils from which to choose, it is important that complete information regarding the nature of the liquid be furnished when ordering B|W induction relays.

1500-C RELAY USED FOR PUMP DOWN CONTROL

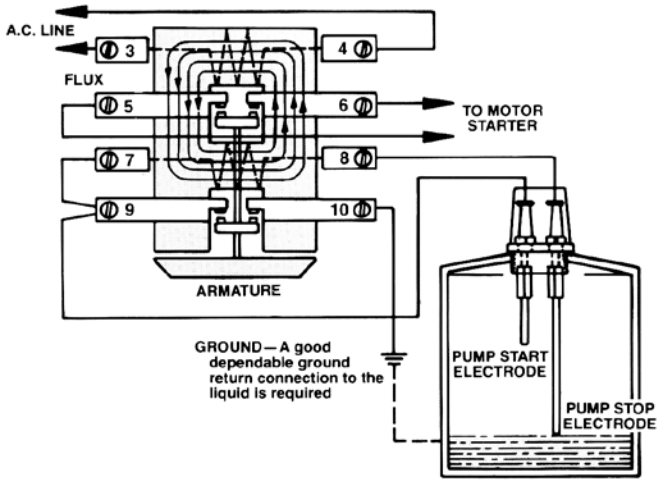

Figure 1—Secondary coil circuit open; armature down.

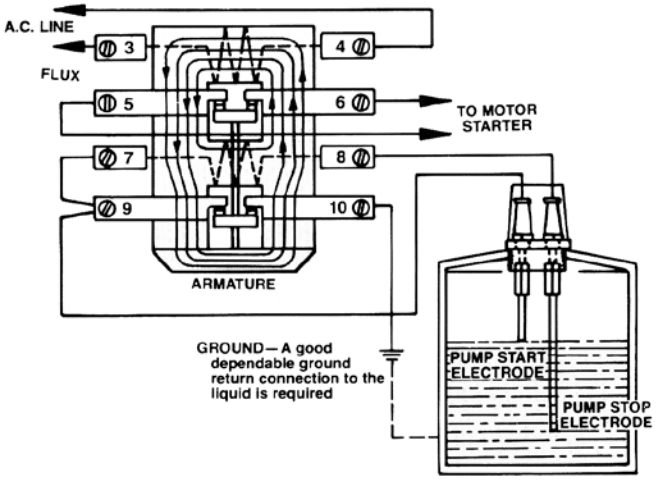

Figure 2—Secondary coil circuit closed; armature up.

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INDUCTION RELAY COIL SELECTION DATA

PRIMARY COIL

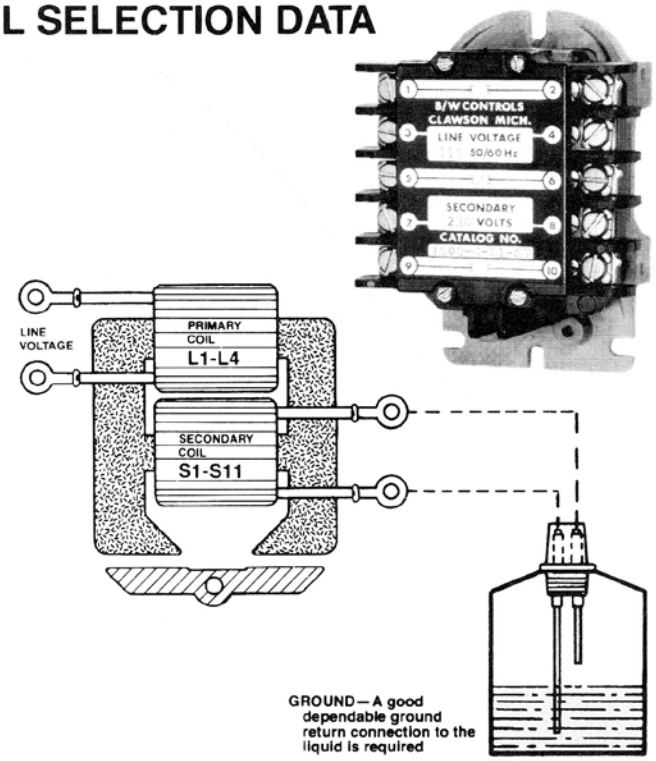
The primary coil voltage should be chosen to match the line voltage of the control system. The 1500 Series Induction Relay can be supplied with any of the following line voltages:

PRIMARY COIL

LINE VOLTAGE	FREQUENCY (Hertz)	MAXIMUM AMPERES (Secondary Shorted)	B|W COIL NUMBER
110-120	50-60	.075	02-089000
208-240	50-60	.038	02-089200
440-480	50-60	.019	02-089300
550-600	50-60	.015	02-089400

SECONDARY COIL SELECTION

Since B|W level control systems use the liquid as an electrical conductor to complete the relay's secondary circuit — and since the resistance of liquids varies, it is necessary that each induction relay be equipped with a secondary coil that will operate over the resistance of the liquid it controls. The following tables list the operating characteristics of various coils available. All values are based on line voltage of 115, 230, 460 or 575 volts at 60 Hertz.



RECOMMENDED SECONDARY COILS FOR VARIOUS TYPES OF LIQUIDS

COIL VOLTAGE	TYPICAL LIQUIDS	MAXIMUM AMPERES (Shorted)	MAX. SPECIFIC RESISTANCE OF LIQUID (ohms–cm)	MIN. SPECIFIC CONDUCTIVITY OF LIQUID (micromho/cm)	COIL NUMBER
12	Metallic circuits.	.44	15	67,000	02-088700
24	Metallic circuits.	.22	61	16,000	02-088800
40	Acid or caustic solutions; Milk; Brine and salt solutions; Plating solutions; Buttermilk; Soups.	.117	216	4,630	02-088900
90	Weak acid or caustic solutions: Beer, Baby foods; Fruit juices.	.053	1,065	940	02-089000
220	Sewage; Most water — except very soft; Pottery slip; Water soluble oil solutions; Starch solutions.	.022	6,650	150	02-089500
360	Very soft water; Sugar syrup.	.013	17,000	59	02-089300
480	Steam condensate; Strong alcohol solutions.	.011	26,600	38	02-089400
800	Demineralized or distilled water.*	.006	92,600	11	02-123700

*Exceptionally pure water produced for some industrial applications requires use of B|W Type 52-Series Solid-State Relay. (See Page 5 of Catalog Section 5200.)

NOTE 1: The maximum closing resistance in ohms over which each coil will operate is approximately equal to the specific resistance values shown above. All B|W relays may be energized indefinitely with the secondary circuit shorted without damaging the coils.

NOTE 2: Maximum distance limitations for typical induction relay secondary circuits are: 220 secondary - 900 feet, 360 secondary - 350 feet, 480 secondary - 250 feet and 800 secondary - 70 feet. For others see Section 8040.

See Page10 for additional liquids.

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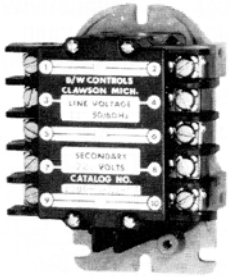
MANUAL RESET RELAYS FOR USE WITH ONE ELECTRODE

BIW Manual Reset relays are basic induction relays equipped with a N.O. or N.C. reset button which permits an operator to reestablish the electrode for high or low level cutoff operation. Once a pump has been stopped by the liquid leaving or contacting the electrode, it cannot be started again until the relay has been manually reset by means of the pushbutton. Available as single pole or double pole — normally open or normally closed — and as single pole, double throw relays. When ordering, please specify operation desired.

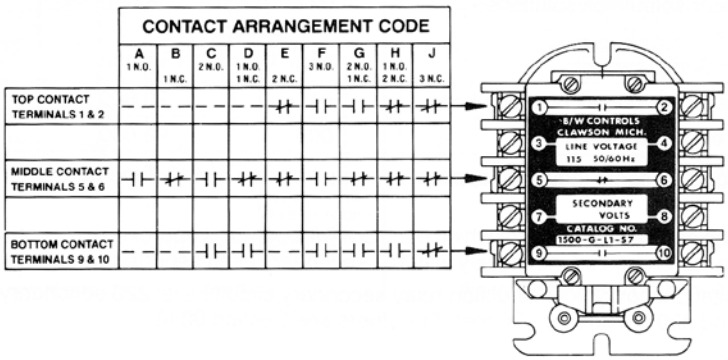


NOTE: When ordering a manual reset relay, indicate an "M" for the last digit of the catalog number on page 11 and indicate if a N.O. or N.C. reset button is required.

CATALOG CODE

See Pages 10 & 11 for Complete Catalog Numbers

	CONTACT ARRANGEMENT			RESET BUTTON	OPERATION AND APPLICATION
	Normally Open	Normally Closed	Holding Circuit		
C	1	0	1	N.O.	Low level cut off with manual reset.
F	2	0	1	N.O.	Same as Type above with additional contact.
D	0	1	1	N.C.	High level cutoff with manual reset.
H	0	2	1	N.C.	Same as above with additional contact.
G	1	1	1	N.C.	High level cutoff and or signal, manual reset.
G	1	1	1	N.O.	Low level cutoff and or signal, manual reset.



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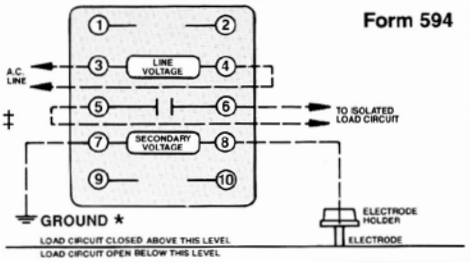
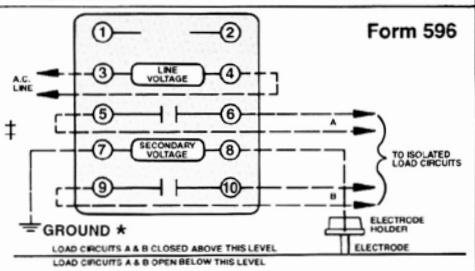
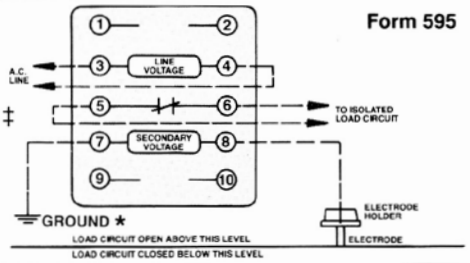
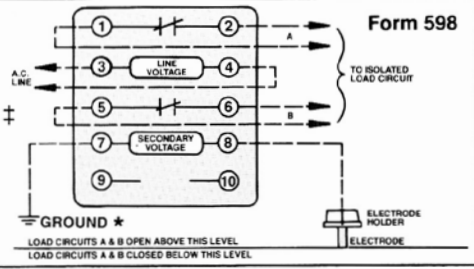
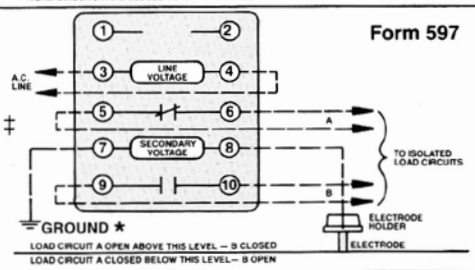
Series 1500
Induction Relays

REFER TO SERVICE BULLETIN FORM 511 FOR DETAILED WIRING

INDUCTION RELAY CONTACT ARRANGEMENT	WIRING DIAGRAM AND OPERATION	TYPICAL APPLICATIONS
1500-A RELAY Contact Arrangement Normally Open: 1 Normally Closed: 0 Holding Circuit: 0		High Level Signal Control. Low Level Cutoff when wired in series with Stop button in 3-wire pushbutton stations. Remote, long distance and low voltage manual control applications, etc. (Similar to 1100-L)
1500-C RELAY Contact Arrangement Normally Open: 2 Normally Closed: 0 Holding Circuit: 0		Same as 1500-A Relay above except that an additional Normally Open contact is provided to permit simultaneous operation of different types of secondary signal devices in remote locations. (Similar to 1100-2L)
1500-B RELAY Contact Arrangement Normally Open: 0 Normally Closed: 1 Holding Circuit: 0		Low Level Signal Control. High Level Cutoff when wired in series with Stop button in 3-wire pushbutton stations. Remote, long distance and low voltage manual control applications, etc. (Similar to 1100-R)
1500-E RELAY Contact Arrangement Normally Open: 0 Normally Closed: 2 Holding Circuit: 0		Same as 1500-B Relay above except that an additional Normally Closed contact is provided to permit simultaneous operation of different types of secondary signal devices in remote locations. (Similar to 1100-2R)
1500-D RELAY Contact Arrangement Normally Open: 1 Normally Closed: 1 Holding Circuit: 0		High or Low Level Signal Control. High or Low Level Cutoff when wired in series with Stop button in 3-wire pushbutton stations. Can also be used to interlock various types of signal devices. (Similar to 1100-D)

CAUTION: Electrodes are terminals of live electrical circuits and must be installed to prevent accidental contact by personnel. Control power must be disconnected before servicing.

*** A GOOD DEPENDABLE GROUND RETURN CONNECTION TO THE LIQUID IS REQUIRED.**

‡ For direct wiring to a 208-240VAC, 1 phase load device, 2 load contacts are required; see Series 1500E, F & H Relays.

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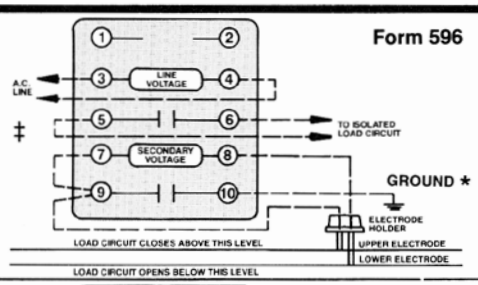
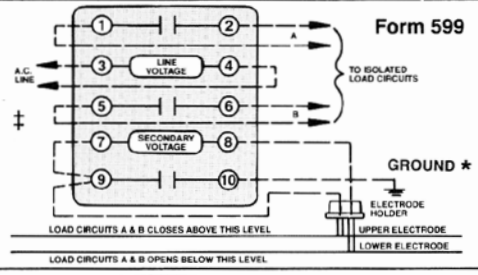
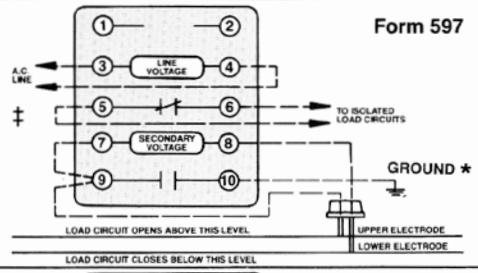
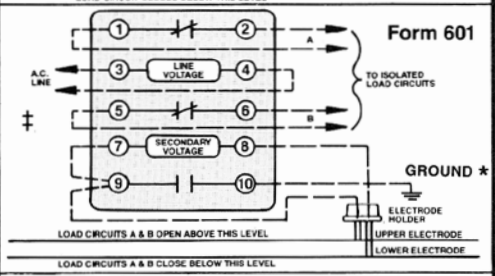
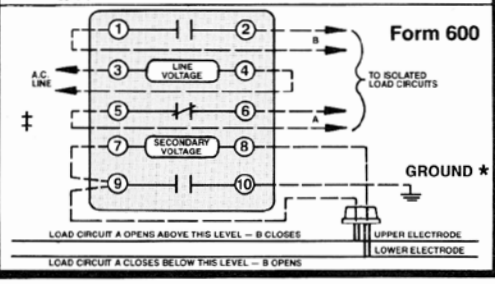
REFER TO SERVICE BULLETIN FORM 511 FOR DETAILED WIRING

INDUCTION RELAY CONTACT ARRANGEMENT	WIRING DIAGRAM AND OPERATION	TYPICAL APPLICATIONS
1500-C RELAY Contact Arrangement Normally Open: 1 Normally Closed: 0 Holding Circuit: 1		Pump Down Control for sewage and sump pumps, condensate return systems, etc. Low Level Cutoff for submersible pumps. Normally closed Solenoid Valve Control for discharging liquids from tanks, etc. (Similar to 1100-LH)
1500-F RELAY Contact Arrangement Normally Open: 2 Normally Closed: 0 Holding Circuit: 1		Same as 1500-C Relay above except that additional Normally Open contact is provided to permit simultaneous operation of second pump. Extra contact can also be used for signal purposes if desired. (Similar to 1100-2LH)
1500-D RELAY Contact Arrangement Normally Open: 0 Normally Closed: 1 Holding Circuit: 1		Pump Up Control for supply pumps on elevated tanks and towers, carbonators, etc. High Level Cutoff for pumps and valves. Normally closed Solenoid Valve Control for plating tank and boiler make-up, etc. (Similar to 1100-RH)
1500-H RELAY Contact Arrangement Normally Open: 0 Normally Closed: 2 Holding Circuit: 1		Same as 1500-D Relay above except that additional Normally Closed contact is provided to permit simultaneous operation of second pump. Extra contact can also be used for signal purposes if desired. (Similar to 1100-2RH)
1500-G RELAY Contact Arrangement Normally Open: 1 Normally Closed: 1 Holding Circuit: 1		Pump Up or Pump Down Control for same applications listed above for B|W 1500-C and 1500-D Relays. It is also suitable for use in controlling hydropneumatic tanks and motorized valve installations. (Similar to 1100-DH)

CAUTION: Electrodes are terminals of live electrical circuits and must be installed to prevent accidental contact by personnel. Control power must be disconnected before servicing.

*** A GOOD DEPENDABLE GROUND RETURN CONNECTION TO THE LIQUID IS REQUIRED.**

‡ For direct wiring to a 208-240VAC, 1 phase load device, 2 load contacts are required; see Series 1500E, F & H Relays.

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CONDUCTIVE LIQUIDS

With the exception of products such as oil, gasoline, animal fats and other similar products, most liquids and some moist bulk materials have sufficient conductivity to use BIW level detecting relays. The Series 1500 relay can be used on liquids with resistance up to about 90,000 ohm-cm (conductivity to 11 micromho/cm). For liquids with higher resistance the BIW Series 5200 relays must be used for applications up to 12 megohms resistance.

Liquids such as milk and beer, and some pharmaceutical products will foam during processing. The liquid phase is always a better conductor than the foam, and when the interface level is to be detected, the relay sensitivity must be carefully selected and it would be wise to check the factory for our recommendation.

With nearly 50 years of experience, Ametek has compiled a history of applications in most major industries around the world. If you have questions regarding the proper relay selection, write us, phone us, or send a sample for test. Chances are that we have the answer for you.

TYPICAL LIQUIDS

The following recommendations are satisfactory for general use, but because the conductivity of liquids varies greatly with concentration, purity, temperature and other factors, some applications may require a different selection.

A number of the products listed are produced as solids such as crystals or powders, and our relay selection is based on the normally used commercial solutions of these materials.

Liquid Description	Secondary Coil
Acetic Acid — Up to 75%	90 Volt *
— 75 to 90%	220 Volt *
— Glacial	Use 5200-H Relay
Acetone	Use 5200-H Relay
Acids — General	40 or 90 Volt *
— Anhydrous	Use 5200-H Relay
Alcohols	Use 5200-H Relay
Alkalies — General	40 or 90 Volt
— Anhydrous	Use 5200-H Relay
Alum Solutions	220 Volt
Aluminum Sulphate	90 Volt
Aluminum Hydroxide	90 Volt
Amino Acids	90 Volt
Ammonia-Anhydrous Liquid	Use 5200-H Relay
Ammonium Chloride	40 Volt
Ammonium Hydroxide (Ammonia)	220 Volt
Ammonium Nitrate	Use 5300 Relay
Ammonium Sulphate	220 Volt
Baby Foods	90 Volt
Barium Chloride	40 Volt
Barium Nitrate	40 Volt
Beer	90 Volt
Black Liquor	40 Volt
Blood	220 Volt
Borax — Up to 10%	220 Volt
— Greater than 10%	90 Volt
Boric Acid	220 Volt
Bread Dough	90 Volt
Buttermilk	24 or 40 Volt
Cadmium Chloride	40 Volt
Cake Batter	220 Volt
Calcium Chloride	40 Volt
Calcium Hydroxide	220 Volt
Carbolic Acid — Up to 90%	220 Volt
— 90 to 100%	Use 5200-H Relay
Catsup	90 Volt
Caustic Soda (Sodium Hydroxide)	40 Volt
Cement Slurry	220 Volt
Chromic Acid	40 Volt *
Citric Acid	40 or 90 Volt *
Coffee	90 Volt
Condensate — Ordinary Water	480 Volt
— D.I. Water	Use 5200-H Relay
Corn Syrup	480 Volt
Corn — Cream Style	90 Volt
Ethylene Glycol	Use 5200-H Relay
Ferric Chloride	Use 5200-L Relay
Ferrous Sulphate	220 Volt

Liquid Description	Secondary Coil
Formaldehyde	Use 5200-H Relay
Formic Acid — Up to 75%	90 Volt *
— 75 to 90%	220 Volt *
Glycerine (Glycerol)	Use 5200-H Relay
Hydrochloric Acid	Use 5200-L Relay
Hydrofluoric Acid — Up to 20%	220 Volt *
— Above 20%	40 Volt *
Hydrofluorsilicic Acid	90 Volt *
Hydrogen Peroxide	Use 5200-H Relay
Jams & Jellies	360 Volt
Juices — Fruit & Vegetable	40 or 90 Volt
Lemon Oil Essence	Use 5200-H Relay
Lignite	800 Volt
Lithium Chloride	40 Volt
Magnesium Hydroxide	90 Volt
Mayonnaise	220 Volt
Methanol	Use 5200-H Relay
Methyl Ethyl Ketone (MEK)	Use 5200-H Relay
Milk	40 Volt
Molasses	220 Volt
Muriatic Acid	40 Volt *
Mustard	40 Volt
Nitric Acid	40 or 90 Volt *
Orange Juice	90 Volt
Paper Stock	220 Volt
Penicillin	220 Volt
Phosphoric Acid	40 Volt *
Plating Solutions	40 or 90 Volt *
Salts — Chemical	40 or 90 Volt *
Sodium Carbonate (Soda Ash)	90 Volt
Sodium Chloride (Table Salt)	40 Volt *
Sodium Hydroxide (Caustic Soda)	40 Volt *
Sodium Hypochlorate	40 Volt
Sodium Silicate (Water Glass)	90 Volt
Soups	40 Volt
Starch Solutions	220 Volt
Sugar — Low Concentrations	220 Volt
— High Concentrations	360 Volt
Sulphuric Acid	Use 5200-L Relay
Vinegar	90 Volt
Water — Sea	40 Volt
— Ordinary Potable	220 Volt
— Ordinary Soft	360 Volt
— Ordinary Condensate	480 Volt
— Purified Distilled	800 Volt or 5200-H Relay
— Purified Deionized	Use 5200-H Relay
Zinc Chloride	40 Volt

* Use 5200-L to minimize corrosion

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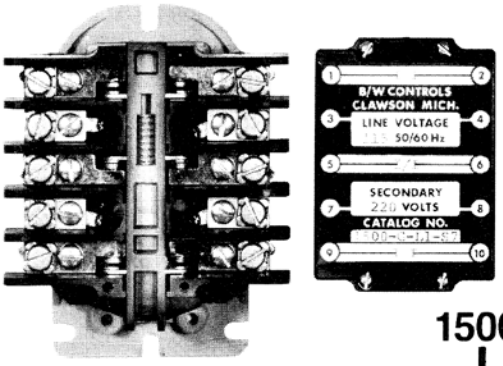

Cat. No. 1500-G-L1-S7
Shown with cover removed

INDUCTION TYPE CONTROL RELAY CATALOG NUMBERING SYSTEM

1500 — A — L1

c UL us
MH8616

Catalog Section

	CONTACT ARRANGEMENTS NORMALLY OPEN	CLOSED
A	1	0
B	0	1
C	2	0
D	1	1
E	0	2
F	3	0
G	2	1
H	1	2
J	0	3

All contacts rated at:
25 Amp Resistive at 120, 240, or 480 VAC
1 HP Single Phase at 120 or 240 VAC
Heavy Duty Pilot 120 to 600 VAC
2 Amp Resistive at 120 VDC
10 Amp Resistive at 48 VDC

	LINE VOLTAGE
L1	110-120 Volts 50/60 HZ
L2	208-240 Volts 50/60 HZ
L3	440-480 Volts 50/60 HZ
L4	550-600 Volts 50/60 HZ
L5	120/240 Volts 50/60 HZ

Consult Factory For Special Line Voltages.

B|W PART NUMBER CROSS REFERENCE

OLD PART NO.	1100 RELAY	1500 RELAY
11-045000	1100-LH-*	1500-C-*
11-045300	1100-2LH-*	1500-F-*
11-044500	1100-RH-*	1500-D-*
11-044800	1100-2RH-*	1500-H-*
11-045500	1100-DH-*	1500-G-*
11-044900	1100-L-*	1500-A-*
11-045200	1100-2L-*	1500-C-*
11-044300	1100-R-*	1500-B-*
11-044700	1100-2R-*	1500-E-*
11-045400	1100-D-*	1500-D-*
11-045100	1100-LM-*	1500-C-*
11-052900	1100-2LM-*	1500-F-*
11-044600	1100-RM-*	1500-D-*
11-053000	1100-2RM-*	1500-H-*
11-052800	1100-DM-1-*	1500-G-*
11-045600	1100-DM-2-*	1500-G-*
		*See Catalog Numbering for Completion of Catalog Number.

EXAMPLE: A liquid level application requires 1 N.O., 1 N.C. and 1 N.O. Holding Contact. The line voltage available is 115 VAC. It is desired to detect the level of storm run-off water. The installation is outside requiring a NEMA 4 water tight enclosure.

CAT. NO. 1500—G—L1–S8—N4—X

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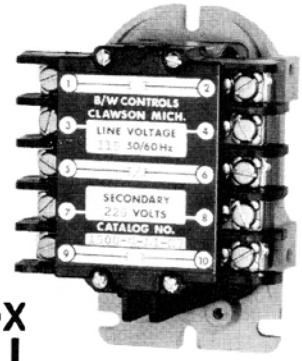
Series 1500
Induction Relays



S7 — N1 — X

	• SECONDARY COIL VOLTAGE	TYPICAL LIQUIDS
S1	12 Volts A.C.	Metallic circuits
S2	24 Volts A.C.	Metallic circuits
S3	40 Volts A.C.	Acid or caustic solutions: Milk; Brine and salt solutions; Plating solutions; Buttermilk; Soups.
S4	90 Volts A.C.	Weak acid or caustic solutions: Beer; Baby foods; Fruit juices.
S7	220 Volts A.C.	Sewage; Most water-except very soft; Pottery slip; Water soluble oil solutions; Starch solutions.
S8	360 Volts A.C.	Very soft water; Sugar syrup.
S9	480 Volts A.C.	Steam condensate; Strong alcohol solutions.
S11	800 Volts A.C.	Demineralized or distilled water.*

• Additional Secondary Coil Voltages Available - Consult Factory

* Exceptionally Pure Water May Require BIW 5200H Series Relay. Catalog Page 17

	ADDITIONAL OPTIONS
X	None
M	Manual Reset Button reset relay. Consult factory for NEMA 7 manual reset option.

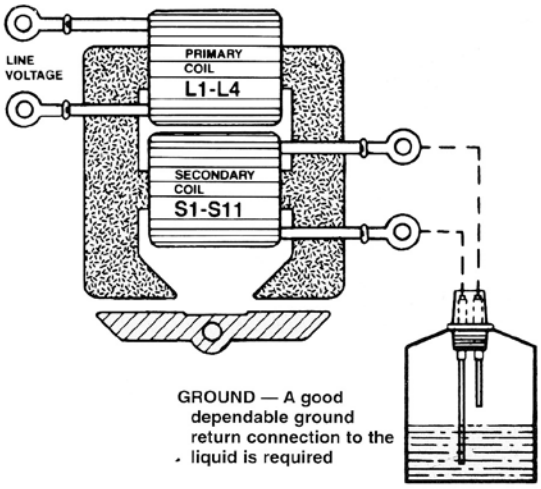
	TYPE OF ENCLOSURE
OC	Open Chassis
N1	NEMA 1, General Purpose
N4	NEMA 4, Weather Proof, Watertight & Dust Tight
N4X	NEMA 4X Fiberglass Watertight, Dust Tight & Corrosion Resistant
N7	NEMA 7, Class I, Group D; Class II, Groups E, F & G
N12	NEMA 12, Oil Tight

NEMA 1

NEMA 4

NEMA 7

NEMA 12



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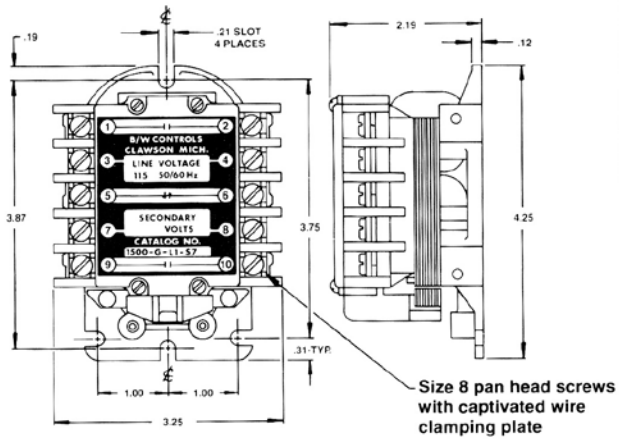
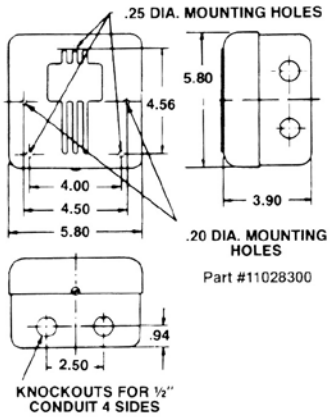
DIMENSIONS

OPEN CHASSIS



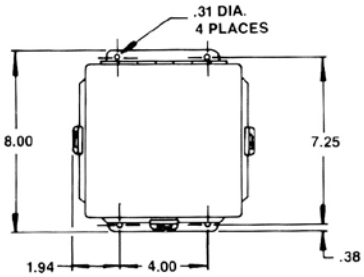
Approx. Shipping weight
1.5 pounds.

NEMA TYPE 1
GENERAL PURPOSE ENCLOSURE

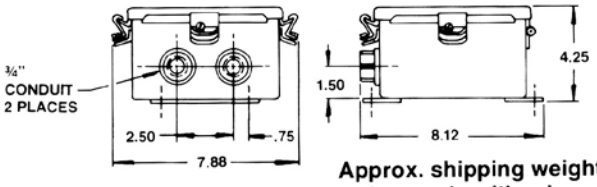


Approx. shipping weight:
5 pounds with relay.

NEMA TYPE 4
WATER & DUST TIGHT ENCLOSURE

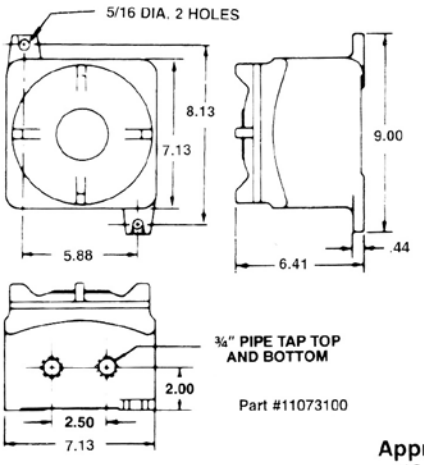


Part #11073800



Approx. shipping weight:
9 pounds with relay.

NEMA TYPE 7
EXPLOSION-PROOF ENCLOSURE

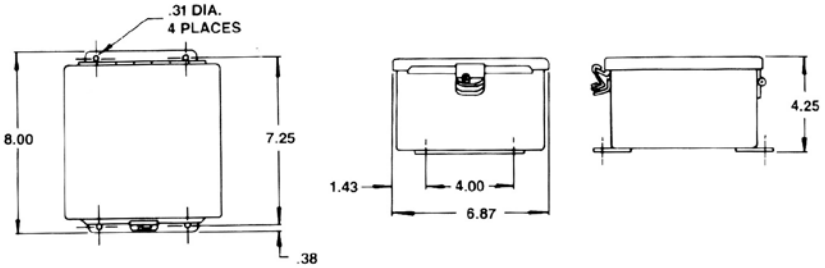


Part #11073100

UL & CSA Rating
Class I, Group D
Class II, Group E, F & G

Approx. shipping weight:
12 pounds with relay.

NEMA TYPE 12
OIL-TIGHT ENCLOSURES



Part #11073900

Approx. shipping weight:
7 pounds with relay.

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Series 5200
Solid State Relays

DESIGN FEATURES

Series 5200 Solid-State Level Control Relays were developed to provide optimum stability and reliability on controlling a wide variety of high and low resistance liquids and moist bulk materials — all well as for general purpose use in applications requiring low voltage control.

Supplied as compact packaged units, they combine performance-proved solid-state printed circuitry with an electromechanical load relay that features isolated double pole/double throw load contacts for energizing pump motors, valves and other operating equipment.

Equipped with silicon controlled rectifiers to assure years of service without change in operating characteristics. They will operate with less than 10% difference between pull-in and drop-out resistance and they can be mounted in any position. Units are field selectable for either direct or inverse operation.

Series 5200 solid state relays are available in two sensitivity ranges—low or high.

UL Recognized and CSA Listed.

SPECIFICATIONS

Dual Voltage: Either 115 or 240 VAC, +10% -20% — 50/60 Hz.

Contacts: Silver cadmium oxide.

Contact Ratings: 10 amperes at 120 or 240 volts ac.—or 28 volts dc.; 1/4 hp at 120 volts ac. and 1/3 hp at 240 volts ac.

Arrangement: Double pole, double throw load contacts plus single pole, double throw holding circuit contacts.

Power Required: 9 voltampere, 6 watt.

Operating Temperature: -40˚F to + 180˚F

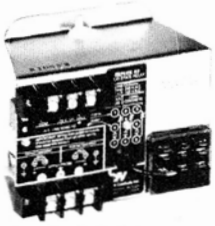
SENSING CIRCUIT:

Low Sensitivity: 8 volt ac and less than 30 ma shortcircuit

High Sensitivity: 9.6 volt dc and less than 1 ma short circuit.

SENSITIVITY: See page 14.

LOW SENSITIVITY RELAY



Low Sensitivity Relay
With R1 Fixed Sensitivity
Resistor
Cat No. 5200-LF1-OC

Low Sensitivity Relay
With Variable Sensitivity
Resistor Potentiometer
Cat No. 5200-LV1-OC

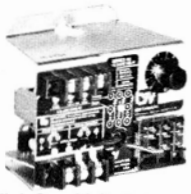
The **LOW SENSITIVITY RELAY** is designed for the control or detection of electrically conductive liquids with low to medium specific resistance.

Typical liquids are ordinary potable and waste water, most acids, plating solutions, fruit juices, soups, beer, milk and soft drinks.

With a low voltage A-C electrode potential the **LOW SENSITIVITY RELAY** operates with no shock or sparking hazard, and no product contamination due to electrolysis. It is ideal for food, drug, dairy and chemical processing applications.

HIGH SENSITIVITY RELAY

High Sensitivity Relay
With R1 Fixed Sensitivity
Resistor
Cat. No. 5200-HF2-OC



High Sensitivity Relay
With Variable Sensitivity
Resistor Potentiometer
Cat. No. 5200-HV3-OC

The **HIGH SENSITIVITY RELAY** is recommended for the control or detection of electrically conductive liquids with medium to high specific resistance. Typical liquids are distilled and deionized water steam condensate, alcohol, glycols and anhydrous ammonia. It is also suitable for detecting or controlling ore, foundry sand and other bulk materials with low moisture content.

The **HIGH SENSITIVITY RELAY** has a low voltage D-C electrode potential and no shock hazard exists in the electrode circuit. Also, the D-C sensing potential makes this relay an excellent choice for use in applications where the relay must be located many thousands of feet away from the electrodes.

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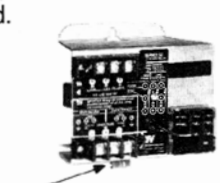
SENSITIVITY SELECTION

BIW level control systems use the liquid as an electrical conductor to complete the Series 5200 relay sensing circuit, and it is necessary that the relay have an operating sensitivity greater than the resistance of the liquid to be controlled. The sensitivity of both models of the Series 5200 relay is determined by the value of the replaceable R1 resistor used. Since the resistance of liquids vary over a very large range, a wide selection of fixed and variable sensitivities are available as detailed on the chart below.

When operating from contacts of pilot switches, any of the resistors can be used but the smallest R1 resistor value is recommended.

FIXED SENSITIVITY

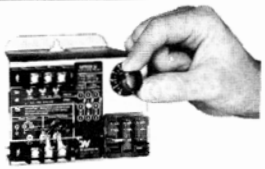
Both the high and the low sensitivity relays are shipped from the factory with a complete set of fixed resistors. The proper R1 resistor must be selected during installation as shown in the diagrams on page 6. Fixed sensitivity resistors are recommended when operating from pilot switch contacts or when the liquid being controlled is always the same.



Fixed R1 Resistor

VARIABLE SENSITIVITY

Both high and low sensitivity relays are available with variable resistance potentiometers. A kit can be supplied for field installation. The low sensitivity model has two variable sensitivity ranges and the high sensitivity model has three sensitivity ranges as shown in the table below. Variable sensitivity models are recommended for applications where the relay is to be used on a variety of liquids. They also should be used for interface detection or on applications where foam is present and it is necessary to operate on the liquid phase only.



Adjustable R1 Potentiometer

	R1 SENSITIVITY RESISTOR		SENSING CIRCUIT LIMITATIONS		MAXIMUM OPERATING SENSITIVITY	
	Nominal Resistance	Part Number	Maximum Capacitance Electrode Wire to Ground	Maximum Lead Wire Lengths	Direct Operation	Inverse Operation
LOW SENSITIVITY RELAY	270 Ohms	04154900	3.7 Microfarads	15,000 feet	200 Ohms	330 Ohms
	470 Ohms	04155000	1.7 Microfarads	15,000 feet	340 Ohms	570 Ohms
	1,000 Ohms	04138300	.80 Microfarads	15,000 feet	730 Ohms	1,200 Ohms
Maximum Sensitivity Direct Operation: 16,000 Ohms Inverse Operation: 26,000 Ohms	1,800 Ohms	04155100	.44 Microfarads	11,000 feet	1,300 Ohms	2,200 Ohms
	3,900 Ohms	04155200	.20 Microfarads	5,000 feet	2,800 Ohms	4,800 Ohms
Electrode Potential 8 volts A.C.	10,000 Ohms	04149400	.08 Microfarads	2,000 feet	7,300 Ohms	12,000 Ohms
	22,000 Ohms	04138400	.036 Microfarads	900 feet	16,000 Ohms	26,000 Ohms
Electrode Current Less than 30 Milliamperes	Variable	52110205	.80 Microfarads	15,000 feet	100-700 Ohms	200-1200 Ohms
	Variable	52110206	.036 Microfarads	900 feet	.6K-15K Ohms	1K-24K Ohms
HIGH SENSITIVITY RELAY	10,000 Ohms	04149400	120 Microfarads	50,000 feet	9,600 Ohms	9,600 Ohms
	22,000 Ohms	04138400	55 Microfarads	50,000 feet	21,000 Ohms	21,000 Ohms
	68,000 Ohms	04138500	18 Microfarads	50,000 feet	66,000 Ohms	66,000 Ohms
	.33 Megohms	04138600	4.0 Microfarads	50,000 feet	.31 Megohms	.32 Megohms
Maximum Sensitivity Direct Operation: 11.6 Megohms Inverse Operation: 12.0 Megohms	.82 Megohms	04138800	1.5 Microfarads	35,000 feet	.80 Megohms	.81 Megohms
	2.2 Megohms	04138900	0.5 Microfarads	12,000 feet	2.1 Megohms	2.2 Megohms
Electrode Potential 9.6 volts D.C.	5.6 Megohms	04139000	0.2 Microfarads	4,000 feet	5.4 Megohms	5.6 Megohms
	12.0 Megohms	04139100	0.1 Microfarads	2,000 feet	11.6 Megohms	12.0 Megohms
Electrode Current Less than 1 Milliampere	Variable	52120205	12 Microfarads	50,000 feet	2K-100K Ohm	2K-100K Ohms
	Variable	52120206	1.2 Microfarads	28,000 feet	7K-1.0 Megohms	7K-1.0 Megohms
	Variable	52120207	0.2 Microfarads	4,000 feet	47K-5.0 Megohms	47K-5.0 Megohms

Distances shown in the tables above are based upon the use of two 18-gauge lead wire in ½" diameter conduit.

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Series 5200
Solid State Relays

DIRECT AND INVERSE OPERATION

Positive fail-safe control can be obtained simply by connecting the proper R1 resistor to the terminal block for direct or inverse operation as shown in the diagrams at right.

In *direct operation,* the load relay is energized when the liquid contacts the *upper* electrode, or Unifloat® reed switch, and electrode current is flowing. In *inverse operation,* the load relay is energized when the liquid falls below the *lower* electrode, or Unifloat® reed switch, and current ceases to flow.

GROUND CONNECTIONS

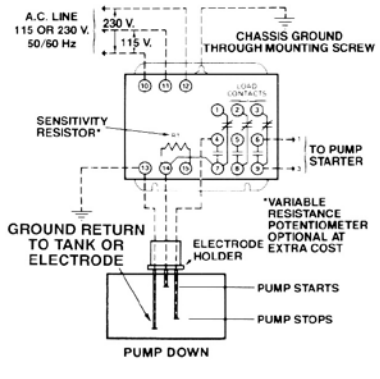
In all installations, a good external ground connection and a dependable return circuit to the liquid are required. In most instances, grounding to a metal pipe leading to the tank is suitable, but electrical conduit should not be used for this purpose.

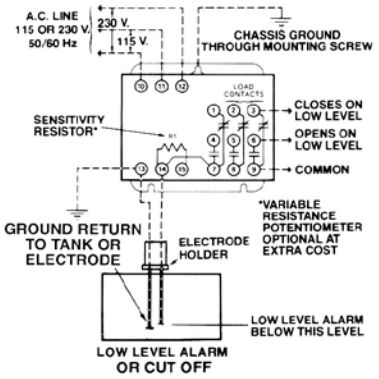
If a good ground connection to the liquid is not available, an additional ground electrode is required. When used, the ground electrode should extend slightly below the longest operating electrode. In addition, it is also desirable to ground the relay chassis directly to ground terminal or through a relay mounting screw.

ELECTRODE LEAD WIRES

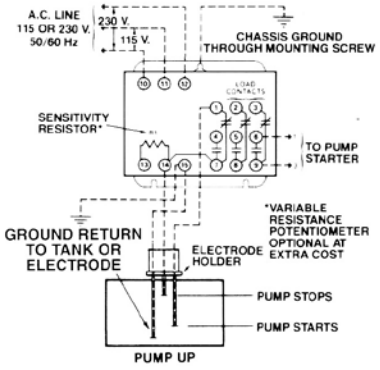
Shielded cable is not required, and ordinary insulated wire can be used for electrode leads. Lead wires should be isolated from, not run in the same conduit with, power and load carrying circuits to avoid direct coupling with these circuits. While capacitance of the lead wire to ground has some slight affect on sensitivity, this factor need only be considered when relay is located more than 900 feet away from electrodes.

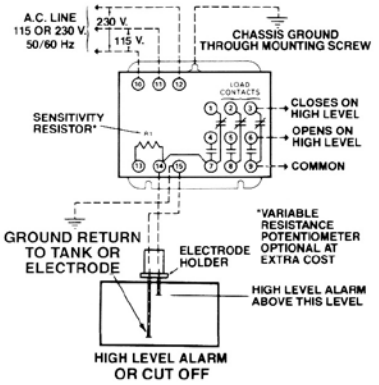
DIRECT OPERATION FROM B|W ELECTRODES



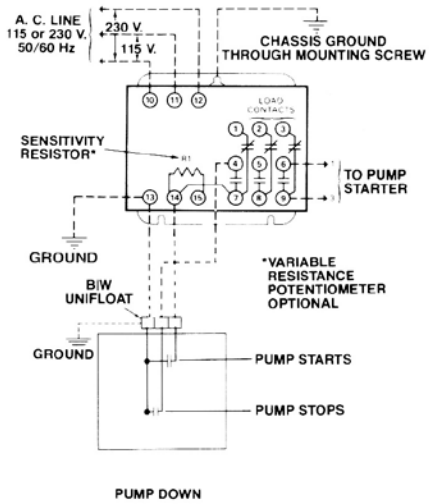


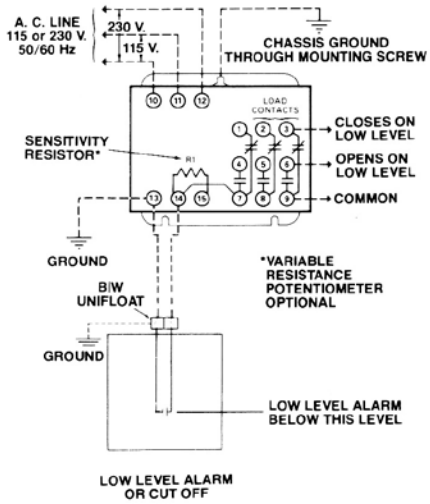
INVERSE OPERATION FROM B|W ELECTRODES





DIRECT OPERATION FROM B|W UNIFLOAT®





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Series 5200 Solid State Relay
with replaceable fixed sensitivity resistor R1

5200

Catalog Section

LOW SENSITIVITY
CONTROL RELAYS

c UL us
E67365

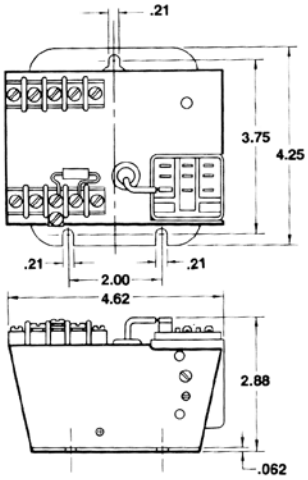
HIGH SENSITIVITY
CONTROL RELAYS

PART NO. CROSS REFERENCE

	OLD PART NO.	NEW CAT. NO.
Low Sensitivity	52-110100	5200-LF1-*
	52-110201	5200-LV1-*
	52-110202	5200-LV2-*
High Sensitivity	52-120100	5200-HF2-*
	52-120201	5200-HV3-*
	52-120202	5200-HV4-*
	52-120203	5200-HV5-*

*See Cat. Numbering System for Completion of Catalog Number

Series 5200 Relay Chassis Dimensions



Series 5200
Solid State Relay
with variable sensitivity
Potentiometer.

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SERIES 5200 CATALOG NUMBERING SYSTEM

—LF1————————————————————————N1

	R1 Sensitivity Resistance	Application Recommendations
LF1 Fixed	270 ohms	All metallic circuits, B/W Unifloat.
	470 ohms	Strong electrolytes: Plating solutions.
	1,000 ohms	Weak electrolytes: Ammonium hydroxide, borax, acetic acid
	1,800 ohms	Most food processing applications: Beer, wine, fruit juices, milk buttermilk.
	3,900 ohms	Highly corrosive acid or caustic solutions where electrode current must be minimized to extend electrode life: Hydrochloric acid, sulfuric acid, etc.
	10,000 ohms	Ordinary water with medium to high mineral content, sewage, water soluble oil and starch solutions.
	22,000 ohms	Most water with low mineral content. (Soft water—*not* distilled or deionized water. Use High Sensitivity Relay Control)
LV1 Variable	Variable 100-700 ohms	Same as above for 270 or 470 or 1000 ohms
LV2 Variable	Variable .6K-15K ohms	Same as above for 1,800 thru 22,000 ohms
HF2 Fixed	10,000 ohms	Ordinary water with medium to high mineral content, sewage, water soluble oil and starch solutions, long distance applications
	22,000 ohms	Water with low mineral content (soft water — not distilled or demineralized), sugar syrup solutions, long distance applications.
	68,000 ohms	Steam condensate, corn syrup, strong alcohol solutions up to 50%
	330,000 ohms	Alcohol solutions up to 70%
	820,000 ohms	Deionized or distilled water, 95% glycerine, 90% hydrogen peroxide, 95% ethyl alcohol, granular solids with high moisture content
	2.2 megohms	Glacial acetic acid, acetone, granular solids with some moisture content
	5.6 megohms	M.E.K. (Methyl ethyl keytone)
	12.0 megohms	Anhydrous ammonia
HV3 Variable	Variable 2K-100K ohms	Same as above for 10,000 thru 68,000 ohms
HV4 Variable	Variable 7K-1.0 megohms	Same as above for 330,000 and 820,000 ohms
HV5 Variable	Variable 47K-5.0 megohms	Same as above for 2.2 and 5.6 megohms

	TYPE OF ENCLOSURE
OC	Open Chassis
N1	NEMA 1, General Purpose
N4	NEMA 4, Water Tight
N4X	NEMA 4X Fiberglass Water Tight, Dust Tight & Corrosion Resistant
N7	NEMA 7, Explosion Proof Class I, Group D, Class II, Group E, F & G
N12	NEMA 12, Oil Tight

NEMA 1

NEMA 7

NEMA 4

NEMA 12

See page 12 for enclosure dimensions.

Note: D1 water, glycols, alcohols and granular solids may require the 2.2, 5.6 or 12.0 megohms R1 resistor depending upon their purity or moisture content.

5200-LF1 and 5200-HF2 Solid State Relays are furnished as standard with a complete set of R1 sensitivity resistors as listed.

Selection of proper resistor should be based on the specific resistance of the material to be controlled. It is important that the R1 resistor selected be rated higher than the resistance of the liquid or other sensing circuit.

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LONG DISTANCE AND LOW VOLTAGE REMOTE CONTROL SYSTEM USING THE SERIES 5200 SOLID STATE RELAY

The Series 5200 Solid State Relay is ideal for long distance and low voltage remote control systems. The Series 5200 Low Sensitivity Relay is used for applications requiring AC sensing circuits. The Series 5200 High Sensitivity Relay is used for applications requiring DC sensing circuits.

In general the maximum distance for an AC sensing circuit is limited by the **capacitance** of the wires connecting the relay to the pilot device. If a DC sensing circuit is used, distance is limited by the **resistance** of the control circuit. (See tables below.) In most cases the size of wire is based on the physical strength required to meet given installation conditions. #14 to #18 gauge wire is generally strong enough for private buried or overhead wiring.

The Series 5200 Solid State Relays are capable of performing control functions directly from electrodes or pilot switching devices located **several miles** away.

Telephone circuits and some communication cables use small wires having relatively high resistance. In all cases, however, control circuit wires must have good insulation, and splices or connections must be watertight and well insulated from ground.

The built-in holding circuit feature shown below allows the Series 5200 Relay to operate over a range of levels and from pushbuttons or other momentary contact switches.

Low Sensitivity 5200-L Relay with 270 ohm R1 resistor: output—8 Volts AC. Current—30 milliamperes. Maximum circuit resistance—200 ohms. Maximum capacitance—3.7 microfarads.

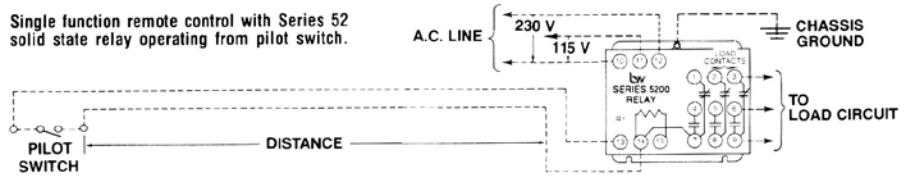
High Sensitivity 5200-H Relay with 10,000 ohm R1 resistor: Output—9.6 Volts DC. Current—1 milliampere. Maximum circuit resistance—9,600 ohms. Maximum capacitance—120 microfarads.

TYPICAL CAPACITANCE AND RESISTANCE VALUES

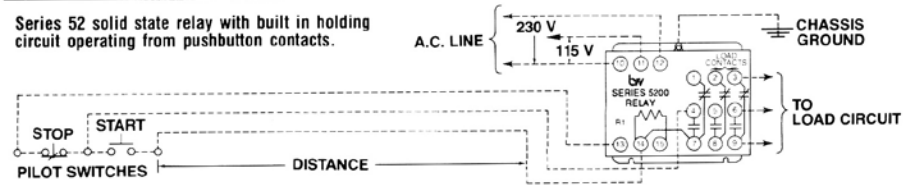
CONTROL WIRES	CAPACITANCE Mfd/1000 feet
Telephone pair	0.015 mfd
Two #14 in open air	0.02 mfd
Two #14 in ½" conduit	0.04 mfd
Two #14 in lead sheath	0.30 mfd
Smaller wires have less capacitance.	

COPPER WIRE SIZE	RESISTANCE Ohms/1000 feet
14 gauge	2.6 ohms
16 gauge	4.1 ohms
18 gauge	6.5 ohms
20 gauge	10.4 ohms
22 gauge	16.5 ohms
24 gauge	26.2 ohms
26 gauge	41.7 ohms

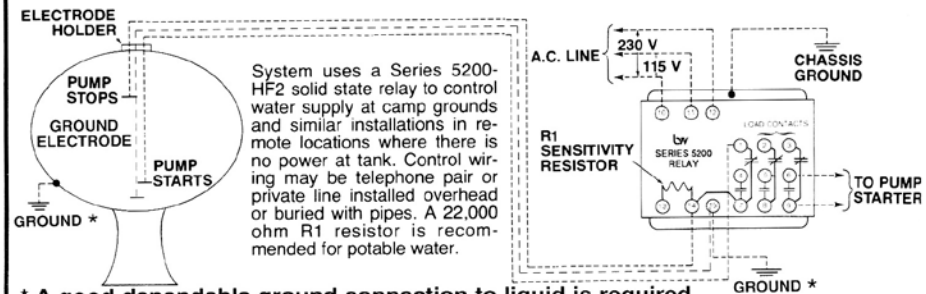
Single function remote control with Series 52 solid state relay operating from pilot switch.



Series 52 solid state relay with built in holding circuit operating from pushbutton contacts.



Single Pump/Pump Up Control with no power at tank—Diagram F-1704



System uses a Series 5200-HF2 solid state relay to control water supply at camp grounds and similar installations in remote locations where there is no power at tank. Control wiring may be telephone pair or private line installed overhead or buried with pipes. A 22,000 ohm R1 resistor is recommended for potable water.

* A good dependable ground connection to liquid is required

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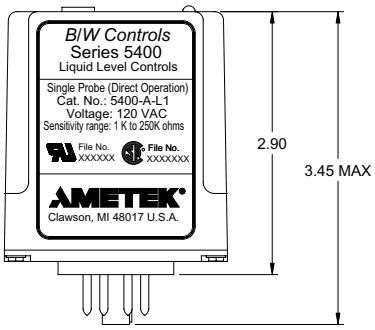
Series 5400
Plug-In Style Relays

Series 5400 Plug-In Style Liquid Level Control Relay

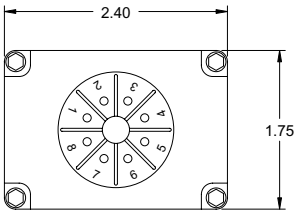
Ordering Information

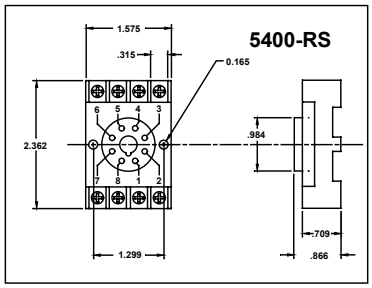
	SINGLE LEVEL		DUAL LEVEL	
	Direct Operation (High Level Alarm)	Inverse Operation (Low Level Alarm)	Direct Operation (Pump Down)	Inverse Operation (Pump Up)
110 Volts A.C.	5400-A-L1	5400-B-L1	5400-C-L1	5400-D-L1

Series 5400 Relay Dimensions



NOTE:
Disconnect power before servicing.





	Telephone Pair	Two #14 in open air	Two #14 in 1/2" conduit	Two #14 in lead sheath
Minimum (1.0k ohms) Sensitivity	In excess of 50,000 feet	In excess of 50,000 feet	In excess of 50,000 feet	8,000 feet
Maximum (250K ohms) Sensitivity	700 feet	530 feet	265 feet	35 feet

COMPACT, PLUG IN, STYLE RELAYS
Designed to operate from electrodes or probes contacting conductive liquids, they are suited to level control applications such as vending, dispensing, ice-making machines, water softeners, dishwashers, and coffee makers, plus many types of operating equipment in the food, drug, dairy, brewing, distilling and chemical processing industries.

Series 5400 Relays have a low energy sensing circuit with a lock-in holding feature that permits operation over a range of levels, or from momentary contact pilot devices such as oat, ow, pressure and limit switches, thermostats and push-button actuators, etc. They are equally suitable for use as original equipment components in many products and systems that require monitoring and control of such process variables as temperature, pressure, humidity, ow, voltage and current, etc.

BASIC SPECIFICATIONS
Voltage: 120 volts ac, 50/60 hertz
24 volts ac, 50/60 hertz (special order)
Power Required: 1.2 volt-amperes max.
Load Contacts: Single pole, double throw. Silver Cadmium Oxide
Contact Ratings: 10 amps resistive load or 1/3 hp at 120 volts ac; 6 amps at 240 volts ac or 28 volts dc. Minimum load is 100 mA at 5 vdc.
Sensing Voltage: 18 vac RMS max.
NOTE: All line voltage circuits are isolated from the low voltage ac sensing circuit to assure optimum safety in service.
Sensing Current: 2.0 mA RMS max.
Sensitivity: Adjustable 1K to 250K ohms +/- 10%. factory set at 100k OHMS +/- 10%
Mounting: 8 pin octal base socket (sold separately)
Time Delay: 5 seconds +/- 10%, other delay times available on 5400-A and 5400-B series only

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5400 Wiring Diagram

DIAGRAM C:
HIGH LEVEL ALARM
5400-A DIRECT OPERATION

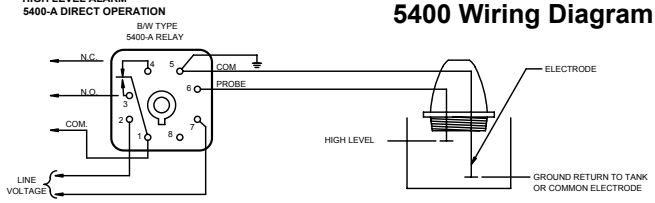


DIAGRAM D:
LOW LEVEL ALARM
5400-B INVERSE OPERATION

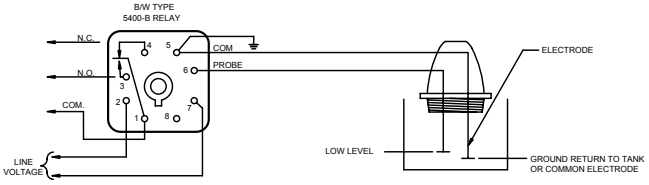


DIAGRAM A:
PUMP DOWN CONTROL
5400-C DIRECT OPERATION

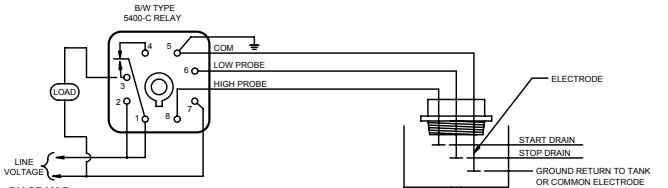
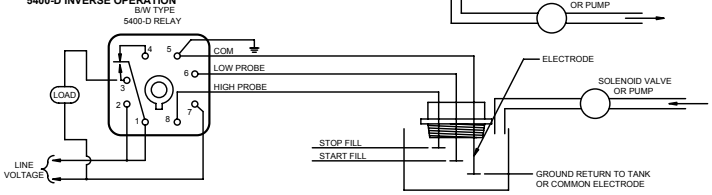


DIAGRAM B:
PUMP UP CONTROL
5400-D INVERSE OPERATION



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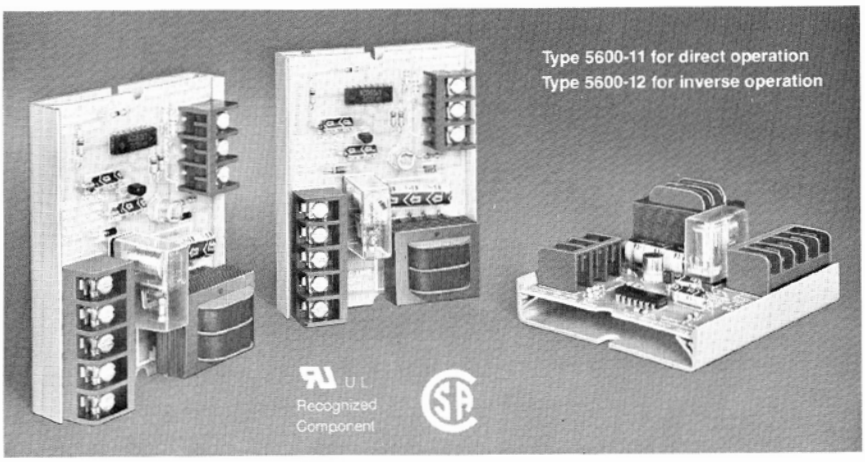
Series 5600
Solid State Relays



NEW COMPACT, LOW-COST RELAYS PROVIDE SAFE, RELIABLE LONG-LIFE OPERATION FOR A BROAD RANGE OF ORIGINAL EQUIPMENT APPLICATIONS

BIW Series 5600 Relays were developed especially for use as safe, reliable, economical original equipment components in many different types of commercial and industrial products.

Designed to operate from electrodes or probes contacting conductive liquids, they are ideally suited for level control applications in such products as vending, dispensing and ice-making machines—water softeners, dishwashers, coffee makers—plus many types of operating equipment in the food, drug, dairy, brewing, distilling and chemical processing industries.

In addition, Series 5600 Relays have a low energy sensing circuit with a lock-in holding feature that permits operation over a range of levels or from momentary contact pilot devices such as float, flow, pressure and limit switches, thermostats and pushbutton actuators, etc. Thus, they are equally suitable for use as original equipment components in many products and systems that require monitoring and control of such process variables as temperature, pressure, humidity, flow, voltage and current, etc.

OTHER FEATURES AND ADVANTAGES

- Choice of direct or inverse operation to provide fail-safe control.
- UL Recognized Component File No. E67365.
- In *direct* operation, load relay is *energized* when the low voltage dc sensing circuit is completed. In *inverse* operation, load relay is *de-energized* when the low voltage dc sensing circuit is completed.

  NOTE: When ordering, please specify Type 5611-00 relays for direct operation applications, and Type 5612-00 relays for inverse operation.
- All line voltage circuits are isolated from the low voltage dc sensing circuit to assure optimum safety in service.
- Low voltage dc sensing circuit also permits location of relays several thousand feet from electrodes or remote pilot devices.
- Relays will operate reliably when mounted in any position required to meet a complete range of application design requirements.
- Barrier-type terminal blocks with saddle clamp screw terminals for 12 to 18 gauge wire are standard. Quick-disconnect tabs or other wiring terminals can also be supplied to meet specific application requirements.
- Load contacts are covered with a clear plastic housing to protect against dust and moisture to assure reliable long-life operation.
- Relays will operate over ambient temperature range from −40° to +150°F (−40° to +66°C).

BASIC SPECIFICATIONS

Voltage: 120 volts ac, 50/60 hertz
240 volts ac, 50/60 hertz
12 volts dc
24 volts dc
Other voltages available on special order.

Power Required: 4 volt-amperes, 2 watts.

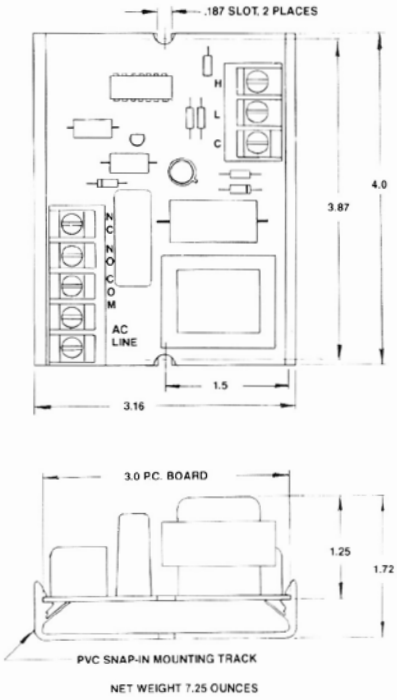
Load Contacts: Single pole, double throw. Gold-flashed silver cadmium oxide.

Contact Ratings: 10 amperes resistive load or 1/3 hp at 120 volts ac; 6 amperes resistive load at 240 volts ac or 28 volts dc.

Sensing Circuit: 17.5 volts dc open circuit; 400 micro-amperes short circuit. Includes a lock-in feature for greater versatility.

Sensitivity: 50,000 ohms fixed is standard. Other sensitivities, fixed or adjustable, are available on special order.

SERIES 5600 RELAY DIMENSIONS



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TYPICAL APPLICATIONS

Diagrams at right illustrate basic details of typical applications in which Series 5600 Relays are used as original equipment components to provide fail-safe control by de-energizing the load in event of power or relay failure.

In Diagram A, Type 5611-00 Relay is used for direct operation to provide automatic *pump down* control for dehumidifiers, sumps, or any other product requiring control of a liquid at a given high level set point. In Diagram B, a Type 5612-00 Relay is used for *inverse* operation to provide *pump-up* control for carbonators, humidifiers, purification stills, etc. where liquid must be kept above a low level set point.

Diagram C shows use of a Type 5611-00 Relay for direct operation to provide low level alarm and/or cutoff with lock-in and manual reset for automatic dispensing, bottling and mixing machines.

Diagram D shows direct operation from a transducer or any other pilot device to perform specific control functions required by many commercial and industrial products.

INSTALLATION NOTES

Because Series 5600 Relays feature a low voltage, low current sensing circuit, inexpensive small gauge lead wires may be used between relays and electrodes, sensors, or pilot switching devices. Shielded cable is not required, and lead wires do not have to be isolated from other wiring. Also, in many level control applications, a common electrode is not required so long as a good, dependable metallic ground return from the relay to the liquid is provided.

DIAGRAM A; PUMP DOWN CONTROL — DIRECT OPERATION

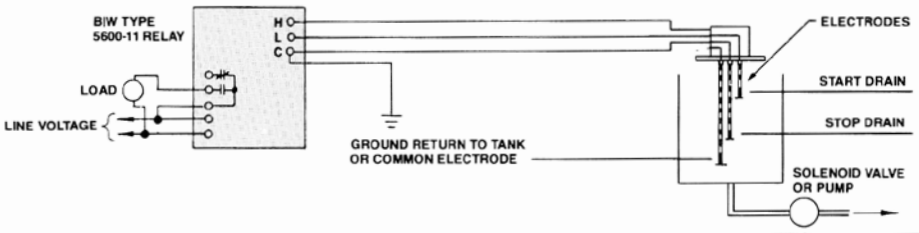


DIAGRAM B; PUMP UP CONTROL — INVERSE OPERATION

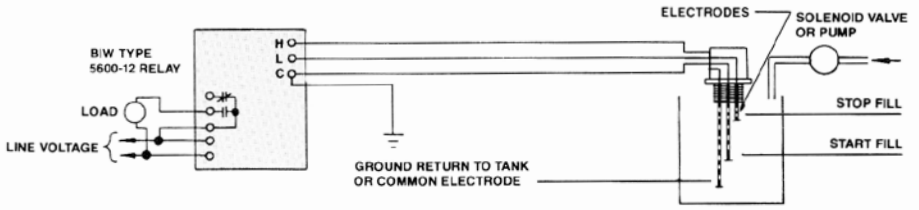


DIAGRAM C: LOW LEVEL ALARM OR CUT OFF — DIRECT OPERATION — WITH LOCK-IN & RESET PUSHBUTTON

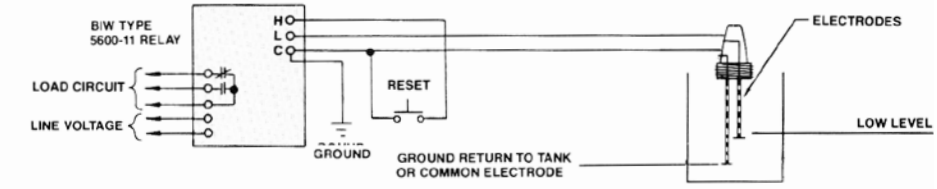
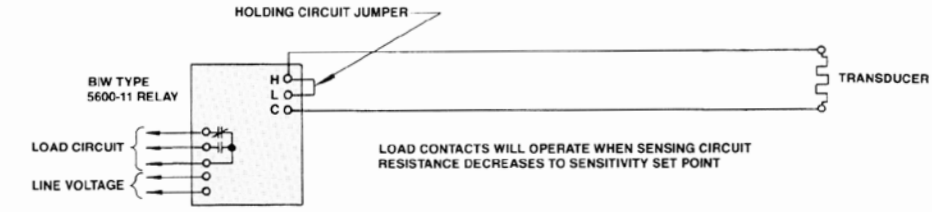


DIAGRAM D: CONTROL FROM RESISTIVE TRANSDUCER — DIRECT OPERATION — LOAD ACTUATION ON DECREASING RESISTANCE



CATALOG NUMBER

5611-0000 Relay for Direct Operation — Specify line voltage
5612-0000 Relay for Inverse Operation — Specify line voltage

The standard sensitivity of the Series 5600 Control Relay is 50,000 ohms. Other sensitivities, fixed or adjustable, are available.

Many special features are available such as time delays, high power relay outputs, and triac outputs.
Consult the factory for your specific requirements.

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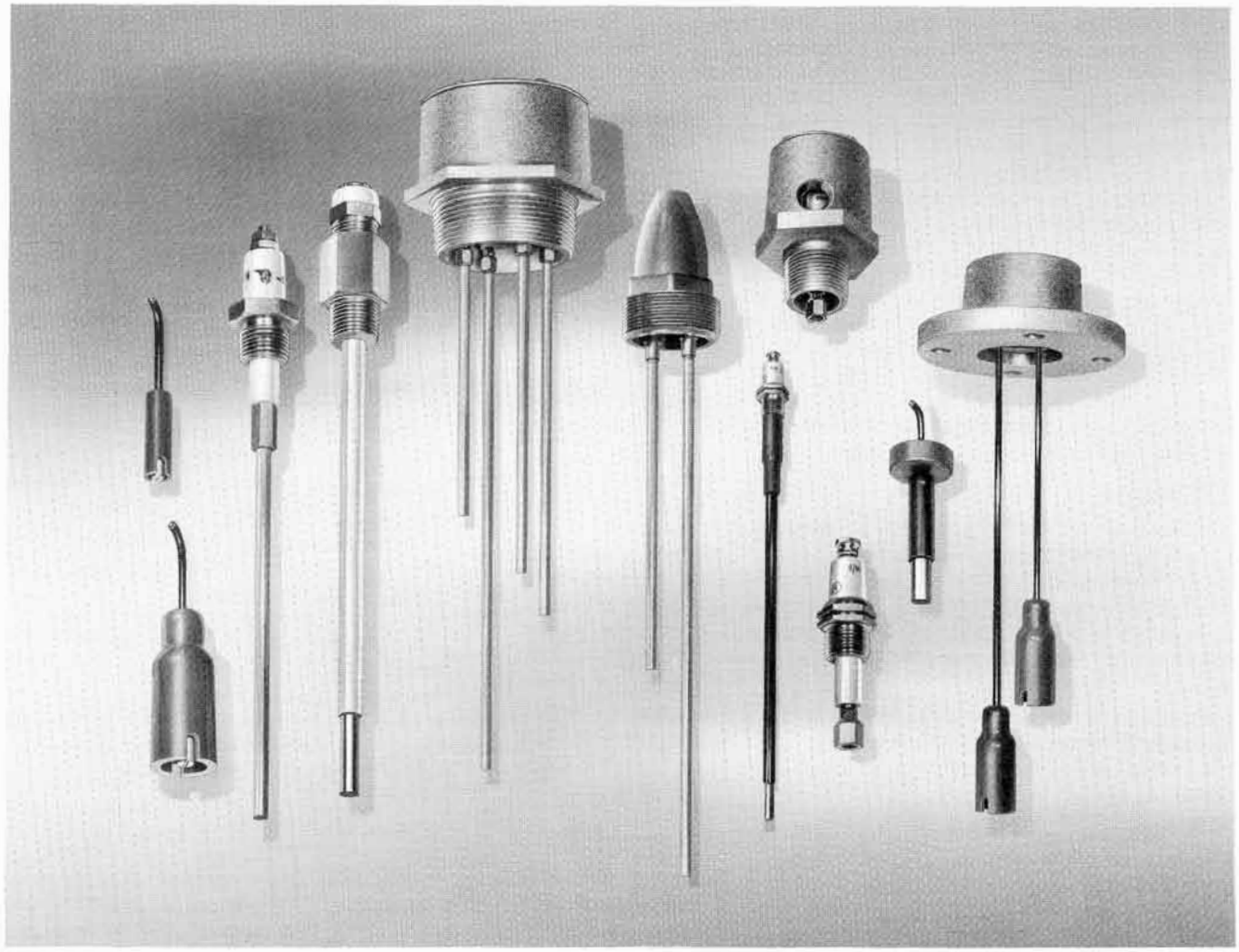
Series 6012/6013
Electrode Holders/Electrodes



Since its introduction is 1933, the original BIW concept of utilizing the electrical conductivity of most liquids as a means of achieving liquid level control has won widespread acceptance as the most versatile and reliable system of its kind. In the BIW system of floatless liquid level control, electrodes or probes are suspended in the container to make contact with the liquid and thus complete a circuit which actuates a BIW relay. The relay contacts in turn are used for a wide range of applications such as controlling pumps and valves, or sounding alarms on level conditions.

Electrodes and holders should be selected according to the specific characteristics of the liquid involved, the lengths required to obtain the desired control of levels, and the physical nature of the container. Because of these factors, the BIW line of electrodes and holders presented in this section has been developed to provide a practical, economical solution to almost every conceivable application and installation problem. When necessary, special equipment can also be supplied to meet specific needs.

Electrodes are normally used with a suitable holder and, wherever possible, should be suspended vertically downward from the top of the tank or other vessel containing the liquid. Also, electrodes are connected to the sensing circuit of a BIW relay. While this is a low energy circuit with inherently limited low current, the electrodes are terminals of a live electrical circuit and must be installed to prevent contact by unauthorized personnel.

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SELECTING AND ORDERING ELECTRODE EQUIPMENT

The first step in selecting electrode equipment is to establish the overall general conditions for the specific application. The control functions desired will determine the BIW relays to be used, and also the number of electrodes required. Factors to be considered include: type of service such as indoor or outdoor installation; type of container for the liquid; nature, temperature and pressure of the liquid; any corrosive or hazardous condition existing; number and length of electrodes.

BIW electrode type of level control may be used on liquids that have sufficient conductivity to operate one of the BIW control relays, and they include potable water, steam condensate D.I. water, sewage, slurries acids, alkalies, salts, beer, blood, alcohols, milk, juices, water soluble oils, brine, plating solutions, baby foods, soups, and many others.

The BIW Unifloat® shown at the bottom of this page should be used for non-conducting liquids such as fuel and vegetable oils, gasolines and many organic chemicals that have specific resistance above 12 megohms-cm (Conductivity less than 0.1 micromho).

To assist in the selection of electrode equipment see the following pages where pictures and basic information is furnished for quick comparison of available types.

ELECTRODE HOLDERS

In general, BIW electrode holders have mounting provisions to mate with standard pipe fittings on the vessel, and the pressure and temperature ratings for the various types are shown on the specification pages. Most holders have water-tight protection for the conduit or cable entrance. Where possible, all electrodes should be grouped into a single holder and mounted on top of the tank with the electrodes extending vertically downward.

Standard electrode holders are suitable for location in explosive hazardous areas, when BIW Series 5300 or 5510 relays with intrinsically safe sensing circuits are used to operate from the electrodes.

ELECTRODE HOLDER
For mechanical mounting and electrical isolation.

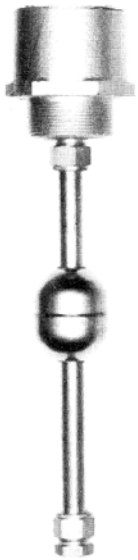
ELECTRODE
Solid rod or wire suspension types are available.

ORDERING INFORMATION

For Electrode Holders
Provide *complete* catalog number which will include number of electrode provisions and any special features.

For Solid Rod Electrodes
Provide *complete* cataog number which will include type, material and length.

For Wire Suspension Electrodes
Provide *complete* catalog number. In most cases the suspension wire and wire connector must be ordered as separate items.



B|W Unifloat®

- Ideal for non-conductive liquids such as gasoline, fuel oil, oily waste and organic chemicals.
- Just one float operates switches for up to 12 sensing levels.
- Simple level adjustment without disturbing tank connections.
- See Catalog Section 7014

ELECTRODES

Solid rod electrodes are generally used where relatively short lengths of 6 feet or less are required. However, care should be exercised when specifying lengths over 3 feet to be certain there is head room to install them, and that liquid movement will not cause bare rods to deflect to touch one another, causing false relay operation.

Wire suspension electrodes are used for long lengths, and generally are more convenient to field set and adjust for operating lengths.

Electrodes subject to turbulence such as found in batching or slurry mixing applications should be strengthened with spacers, protected with a stilling tube, or Ruggedized Electrodes should be used. Gland electrode assemblies are recommended for installation in pipe lines or other applications where side thrust is to be encountered.

CORROSION RESISTANCE

Ametek offers holders and electrodes in a variety of materials, and a standard arrangement is usually available to meet most situations. However, the rate of corrosion is affected by the concentration and temperature of the liquid as well as the presence of impurities or other compounds. Therefore, corrosion information in this catalog should be used as a general guide and the final choice should be based on previous experience and knowledge for the actual application conditions.

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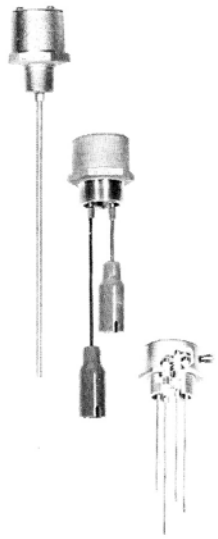
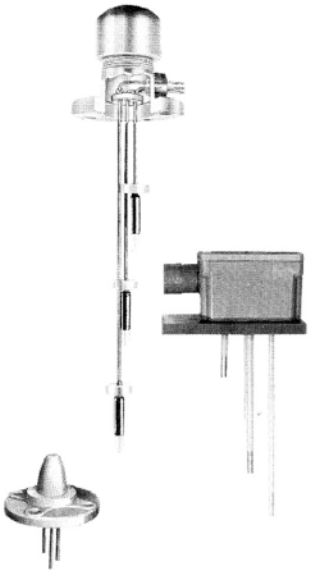
Series 6012/6013
Electrode Holders/Electrodes

The following chart is provided to assist in selecting the proper Electrode Holder for your application. Refer to the Catalog Sections listed below for dimensions, list prices and additional engineering information.

For information on electrodes see Catalog Section 6013 page 43 for wire suspension electrodes and page 44 for solid rod electrodes.

	EXTERNAL PIPE THREADED ELECTRODE HOLDERS			ELECTRODE PLUGS	FLANGED CAST IRON ELECTRODE HOLDERS			FLANGED PVC ELECTRODE HOLDERS			
											
MOUNTING ATTACHMENT TO VESSEL	1" NPT	2" NPT	3" NPT	⅜" PTF	3" FLANGE	4" FLANGE	6" FLANGE	1" FLANGE	2" FLANGE	4" FLANGE	5"x6" RECT.
Number of Electrodes	1	2-3	4-7	1	1-7	1-13	1-13	1 Bare Or 2 Insulated	1-4	1-7	1-5
Temperature and Pressure of Liquid *Specify #04141300 Electrode Plug	Mat'l.	Max. Temp. °F.	Max. Pressure	Up to 2000 psi	190°F 0 psi			180°F 0 psi with Wire Suspended Electrodes 10 psi with Rod Electrodes			
	Brass	200°F	500 psi								
		400°F*	250 psi								
	Cast Iron	200°F	500 psi								
		400°F*	250 psi								
	316 Stainless	200°F	2000 psi								
		450°F	400 psi								
CORROSION RESISTANCE	Available in Brass, Cast Iron or 316 Stainless			304SS	Cast Iron			Unplasticized Polyvinyl Chloride (PVC)			
Solid Rod Electrode (For lengths less than 6 ft.)	Available			Available	Not Available			Available			
Wire Suspended Electrodes	Available			Available	Available			Available			
Type of Service	Watertight, Outdoor Heavy Duty			Industrial Duty	Watertight, Outdoor Heavy Duty			Industrial Duty PVC for Corrosion Resistance and Watertight			
Electrode Height Adjustability	Solid Rod Electrodes Cut to Desired Length				Adjustable			Adjustable with Wire Suspended Electrodes			
	Catalog Section 6012			Catalog Section 6012	Catalog Section 6012			Catalog Section 6012			

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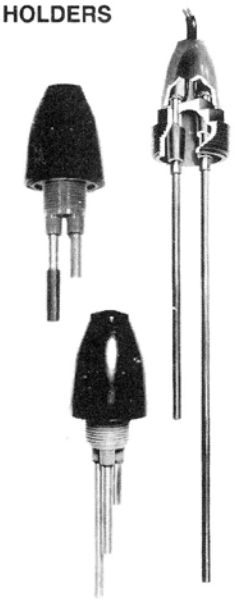
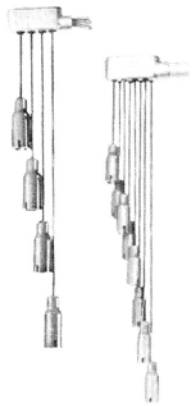
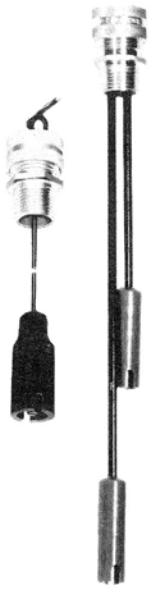
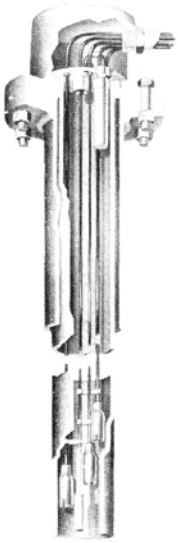
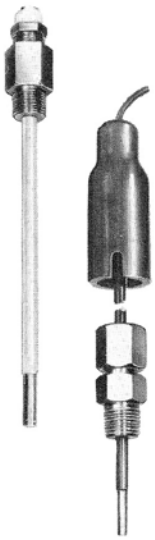
MOLDED EXTERNAL THREADED ELECTRODE HOLDERS	CONDUIT ELECTRODE HOLDERS	CORD GRIP ELECTRODE HOLDERS	ICE-FREE ELECTRODE ASSEMBLY	GLAND ELECTRODE ASSEMBLIES	SPECIAL PURPOSE ELECTRODE ASSEMBLIES
					
1-14 STRAIGHT THREAD / 1-14 STRAIGHT THREAD / 2" NPT	½" NPT or ½" PVC / 1" NPT or 1" PVC	½" NPT / ½" NPT	4" FLANGE	⅜" NPT / ½" NPT	VARIOUS
2 / 3 / 2	1-4 / 1-8	1 / 2	1-9	1 / 1	1
Up To 200 psi and 350°F / 100°F 250 psi; 180°F 0 psi	190°F 0 psi	190°F 0 psi	190°F 0 psi	100 psi @ 150°F or 250 psi @400°F	190°F 0 psi	See Catalog Section
Thermoplastic Holder with 304 Stainless Studs	PVC or Cast Iron	Aluminum	Cast Iron	Various / 304 ss	See Catalog Section
Available	Not Available		Special	Standard	See Catalog Section
Not Available / Avail-able	Available	Available	Standard	Not Available	See Catalog Section
Special Applications	Watertight Industrial Duty	Industrial Duty	Watertight, Outdoor Heavy Duty	Special Applications	See Catalog Section
Solid Rod Electrodes Cut to Desired Length	Adjustable	Adjustable	Adjustable	Fixed / Adjust-able	See Catalog Section
Catalog Section 6012	Catalog Section 6012	Catalog Section 6012	Catalog Section 6012	Catalog Section 6013	Catalog Section 6013

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CAST PRESSURE-TIGHT ELECTRODE HOLDERS WITH EXTERNAL PIPE THREAD

B|W pressure-tight electrode holders are designed especially for applications which require a positive, leak-proof assembly. Such installations include boiler feed and condensate return systems, hydropneumatic tanks, and various types of chemical processing equipment, etc.

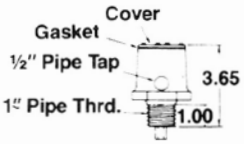
Whenever possible, these holders should be mounted in a vertical position through the top of the tank with the electrodes extending downward to the desired operating levels.

For applications requiring flange mounting B|W offers companion flanges in 2", 3", or 4" sizes made of cast iron or 304 SS. See Catalog Section 7014.

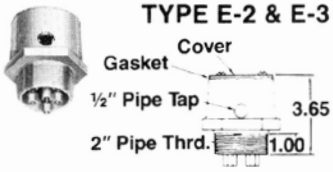
TYPE E-4 HOLDER WITH ROD ELECTRODES

TYPE E-4 HOLDER WITH E-1P ELECTRODES

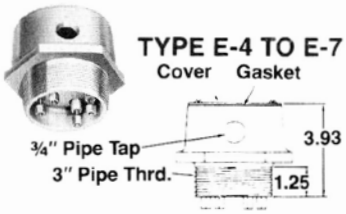
TYPE E-1 Holder



TYPE E-2 & E-3



TYPE E-4 TO E-7



6012 — E1 — CI — EP1

CATALOG SECTION

	HOLDER MATERIAL
CI	Cast Iron
BR	Brass
SS	316 Stainless Steel

	No. of Electrodes	Mounting Thread	Shipping Weight
E1	1	1" Pipe	1.5 LB
E2	2	2" Pipe	3.0 LB
E3	3	2" Pipe	3.0 LB
E4	4	3" Pipe	5.0 LB
E5	5	3" Pipe	5.0 LB
E6	6	3" Pipe	6.0 LB
E7	7	3" Pipe	6.0 LB

NOTE — Price of electrode holder includes a standard electrode plug as indicated in the chart to the right.

	ELECTRODE PLUGS FOR CAST IRON & BRASS HOLDERS
EP1	Furnished as standard equipment. Suitable for most applications. Up to 250 psi at 212°F (100°C). Up to 700°F (371°C) at 100 psi.
EP2	Recommended for saturated steam applications Up to 250 psi at 400°F (204°C) Up to 550°F (288°C) at 200 psi
EP3	Recommended for low pressure applications that are subject to some vibration or shock. Also for long electrode rods.
EP4	Used only for non pressure applications and only for wire suspension electrodes where the standard plug and wire connector arrangement is not suitable.
X	Holder furnished without electrode plugs but with the specified number of ⅜-18 Dryseal pipe thread holes for the plugs.

	ELECTRODE PLUGS FOR 316 SS HOLDERS
EP2	Furnished as standard equipment. Suitable for many corrosive applications, and for saturated steam up to 400 psi and 445°F (230°C).
EP3	Recommended for low pressure applications that are subject to some vibration or shock. Also for long electrode rods.
X	Holder furnished without electrode plugs but with the specified number of ⅜-18 Dryseal pipe thread holes for the plugs.

CROSS REFERENCE TO OLD B|W PART NUMBERS

HOLDER TYPE	NUMBER OF ELECTRODES	MATERIALS AND PART NUMBERS		
		BRASS	CAST IRON	316 STAINLESS
E-1	1	12-048000	12-048100	12-048200
E-2	2	12-048400	12-048500	12-048600
E-3	3	12-048800	12-048900	12-049000
E-4	4	12-049200	12-049300	12-049400
E-5	5	12-049600	12-049700	12-049800
E-6	6	12-050000	12-050100	12-050200
E-7	7	12-050400	12-050500	12-050600

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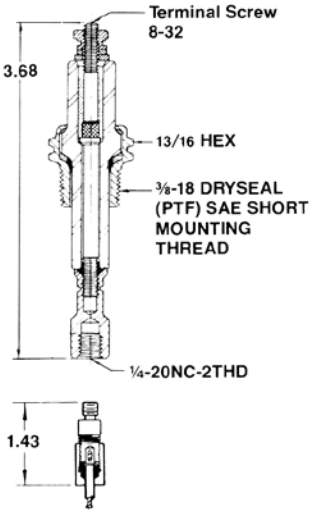
Ametek offers a wide selection of BIW electrode plugs for mounting electrodes in tanks and vessels. They are designed to meet a variety of environmental conditions to provide a strong mechanical mounting and to insulate the electrode from the tank structure; they also have a secure method to make the electrode lead wire connection to the BIW control relay. Details of a typical pressure tight electrode plug are shown in the diagram at the right. The central rod is sealed to the inside of the ceramic insulator glass, and the stainless steel bushing is sealed to the outside of the insulator with copper and/or Teflon® gaskets.

Electrode plugs are included in the Type E electrode holders. Also, these plugs are often used on OEM applications to provide reliable and inexpensive individual mounting of electrodes in special situations.

Other types of electrode plug and electrode assemblies are described in this Section. Should none of our standard items be suitable, special electrodes can be made to order to meet specific operating and/or installation conditions.

ELECTRODE PLUGS



WIRE CONNECTOR
One required with each wire suspension electrode.

SOLID ROD ELECTRODES

Type A rod is used for short electrodes and is available in a variety of corrosion-resisting materials.

WIRE SUSPENSION ELECTRODES

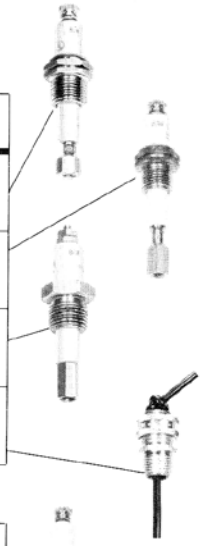
These electrodes are used for long lengths and where space prevents use of rod electrodes.

6012 — EP2

CATALOG SECTION

	OLD PART NUMBER	MOUNTING THREAD	CONSTRUCTION MATERIALS	PRESSURE/TEMPERATURE RATINGS
EP1	04-126400	⅜-18 Dryseal (PTF) SAE Short Pipe Thread	Shell–303SS Insulator–Ceramic Seal–Glass & Copper	2000 psi Up to 200°F (93°C) 700°F (371°C) Up to 100 psi
EP2	04-141300	⅜-18 Dryseal (PTF) SAE Short Pipe Thread	Shell–303SS Insulator–Ceramic Seal–Glass & Teflon®	2000 psi Up to 200°F (93°C) 550°F (288°C) Up to 200 psi Saturated Steam Up to 450 psi
EP3	04-149600	⅜-18 Dryseal (PTF) SAE Short Pipe Thread	Shell–303SS Insulator–Teflon® Seal–Teflon®	500 psi Up to 270°F (132°C) 300°F (149°C) Up to 250 psi Saturated Steam Up to 125 psi
EP4	12-066400	⅜-18 NPT Pipe Thread	Shell–Aluminum Cord Grip with Neoprene Packing	For Nonpressure Use Up to 190°F (88°C) (Only for wire suspension electrodes)

These plugs can be installed in Type E Holders.



6012 — EP5

CATALOG SECTION

	OLD PART NUMBER	MOUNTING THREAD	CONSTRUCTION MATERIALS	PRESSURE/TEMPERATURE RATINGS
EP5	04-134900	⅝-24 NEF-3 Machine Thread	Shell–303SS Insulator–Ceramic Seal–Glass & Copper	2000 psi Up to 200°F (93°C) 700°F (371°C) Up to 100 psi

This plug is for separate mounting only.

ELECTRODE PLUG COVER		
Catalog Number	Old Part No.	Designed to insulate and protect the electrode lead connection. Made of neoprene and fits all standard plugs.
6012-PC	04-129000	

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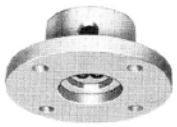
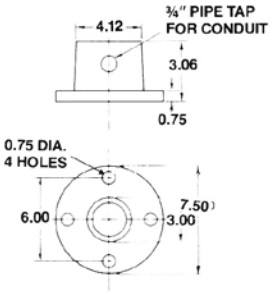
FLANGED CAST IRON ELECTRODE HOLDERS

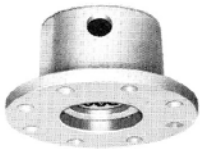
These flanged holders are for use with B|W wire suspension electrodes in non-pressure applications such as elevated tanks, water reservoirs, underground storage tanks, sewage wet wells and other installations requiring relatively long electrode lengths. They are of rugged construction made of cast iron with baked aluminum paint finish to be very durable for many years of outdoor exposure. Available in 3", 4" and 6" sizes which fit the 125 Lb. Cl and 150 Lb. steel mounting flange specifications.

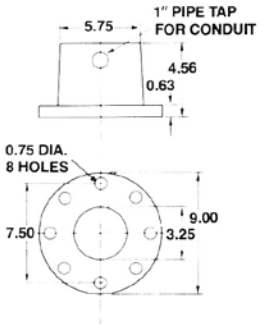
These holders have a removable inner plate provided with a grommet for each wire suspension electrode. The grommets are sized to give a snug vapor tight fit with B|W Type SW electrode suspension wire, and the electrodes are secured by means of a simple overhand knot in the suspension wire as shown in the picture below. The mounting plate with electrodes attached can be easily removed through the top of the electrode holder to facilitate cleaning and adjustment of the electrodes when required.



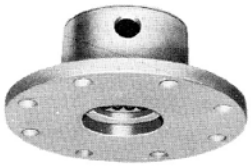


TYPE E-55-3 HOLDER
3 inch Cast Iron 125 lb. Mounting With Aluminum Paint Finish For 1 to 7 Wire Suspension Electrodes.

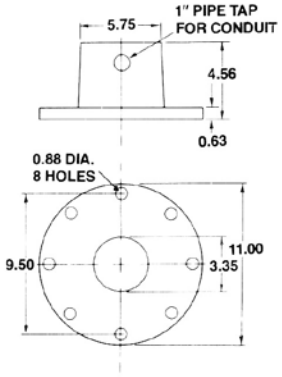




TYPE E-55-4 HOLDER
4 inch Cast Iron 125 lb. Mounting With Aluminum Paint Finish For 1 to 13 Wire Suspension Electrodes.

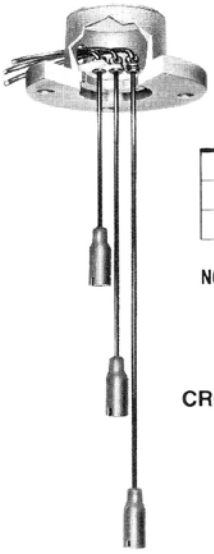


TYPE E-55-6 HOLDER
6 inch Cast Iron 125 lb. Mounting With Aluminum Paint Finish For 1 to 13 Wire Suspension Electrodes.



6012 — E553 — 5E

CATALOG SECTION



	Mounting Provision	Number Of Electrodes	Shipping Weight
E553	3 in. Flange	1-7	14 lb.
E554	4 in. Flange	1-13	24 lb.
E556	6 in. Flange	1-13	30 lb.

NOTE: These holders are not available for use with solid rod electrodes. For applications requiring rod electrodes with flange mounting, use a Type E holder and a separate threaded mounting flange.

CROSS REFERENCE TO OLD B|W PART NUMBERS

Holder Type	Old Part Number
E-55-3	12-054400
E-55-4	12-056400
E-55-6	12-056700

These electrode holders are for non pressure applications only

	Number Of Openings Provided For Wire Suspension Electrodes
1E	1
2E	2
3E	3
4E	4
5E	5
6E	6
7E	7
8E	8
9E	9
10E	10
11E	11
12E	12
13E	13

NOTE: The required wire suspension electrodes must be ordered as separate items.

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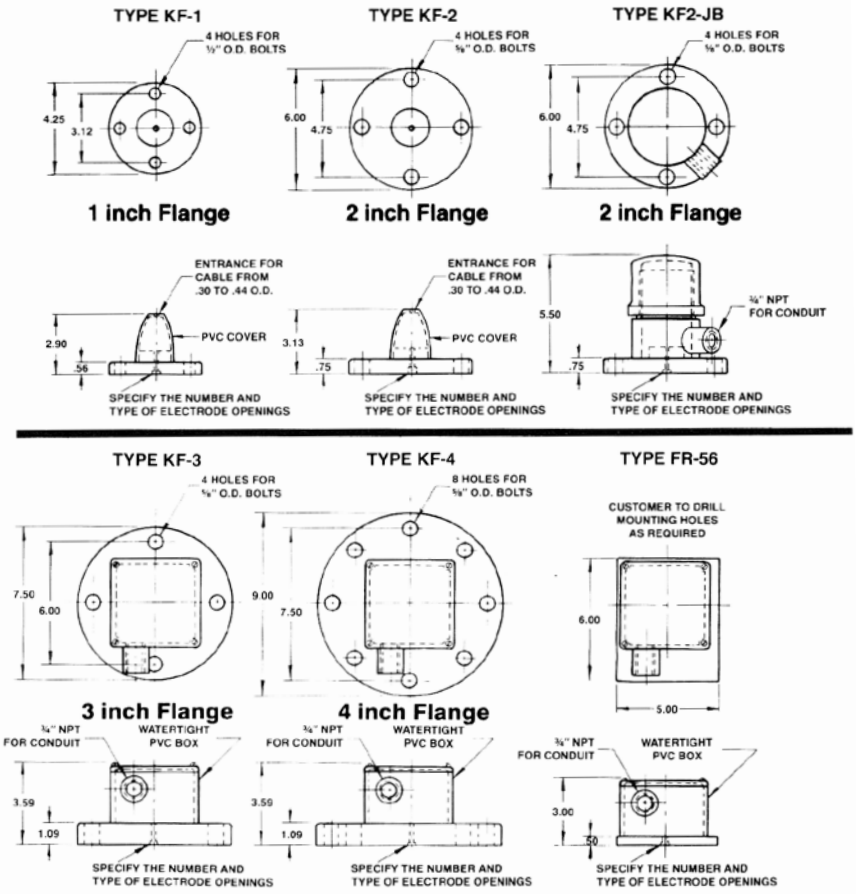
These versatile corrosion resistant electrode holders are made of unplasticized PVC for use on industrial and chemical applications such as acid storage tanks, plating tanks and liquid waste treatment systems. They are suitable for ambient temperatures up to 180°F (82°C). They include a watertight PVC cover or a junction box. Types are available for mounting on standard 1", 2", 3" or 4" flanges. The Type FR56 is intended for mounting on the corner of an open flanged rim tank, and only requires minimum space in the tank.

Models are available for use with either solid rod or wire suspension electrodes which must be ordered as separate items for field assembly at time of installation.

Solid rod electrodes extend thru the bottom of the holder and are tightened against a shoulder which provides a vapor tight seal for up to 10 psi. Rods should be insulated for lengths greater than 30 in.

Wire suspension electrodes are recommended for lengths over 6 feet. The BIW Type SW suspension wire is brought into the holder through a clearance hole and is secured by a knot as illustrated below. The Type 13-064700 electrodes are available in the same selection of materials as the solid rods and must be used for corrosive liquids.



6012 — KF3 — 4 — RC

CATALOG SECTION

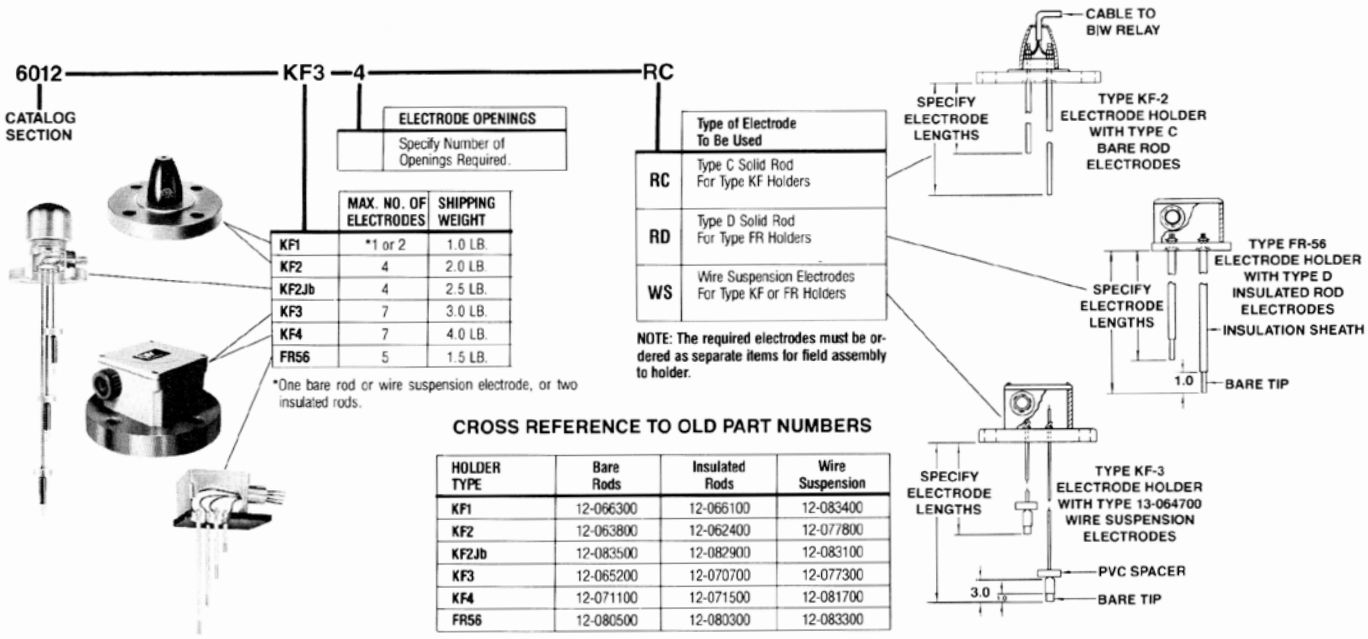
ELECTRODE OPENINGS
Specify Number of Openings Required.

	MAX. NO. OF ELECTRODES	SHIPPING WEIGHT
KF1	*1 or 2	1.0 LB.
KF2	4	2.0 LB.
KF2Jb	4	2.5 LB.
KF3	7	3.0 LB.
KF4	7	4.0 LB.
FR56	5	1.5 LB.

*One bare rod or wire suspension electrode, or two insulated rods.

	Type of Electrode To Be Used
RC	Type C Solid Rod For Type KF Holders
RD	Type D Solid Rod For Type FR Holders
WS	Wire Suspension Electrodes For Type KF or FR Holders

NOTE: The required electrodes must be ordered as separate items for field assembly to holder.



CROSS REFERENCE TO OLD PART NUMBERS

HOLDER TYPE	Bare Rods	Insulated Rods	Wire Suspension
KF1	12-066300	12-066100	12-083400
KF2	12-063800	12-062400	12-077800
KF2Jb	12-083500	12-082900	12-083100
KF3	12-065200	12-070700	12-077300
KF4	12-071100	12-071500	12-081700
FR56	12-080500	12-080300	12-083300

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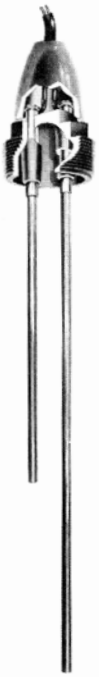
Series 6012/6013
Electrode Holders/Electrodes

MOLDED ELECTRODE HOLDERS



Type AE-2 with rod electrodes

Type CE-2 & CE-3 Holders — These small holders are primarily for use in original equipment applications where available space is limited and where desired level control can be obtained with two or three short solid rod electrodes. They are furnished with a flexible PVC water-tight cover to protect lead wire junctions.

A choice of two thermoplastic materials is available with ratings as shown below. Pressure seal is accomplished with a Buna N gasket included with each holder. They have 303SS studs with 6-32 male thread for electrode connections.

HOLDER MATERIAL	MAXIMUM RATINGS
Nylon	200 psi @ 200°F (93°C) 350°F (177°C) @ 0 psi

Type CE-2 Holder
For 2 Rod Electrodes
1"-14 Straight Machine Thread

Type CE-3 Holder
For 3 Rod Electrodes
1"-14 Straight Machine Thread

CATALOG NUMBER
6012 — CE2N

	Holder Material	Old Part Number
CE2N	Nylon	12-082500

CATALOG NUMBER
6012 — CE3N

	Holder Material	Old Part Number
CE3N	Nylon	12-082700

NOTE: The required Type 6B rod electrodes must be ordered as separate items.
Maximum recommended bare rod length is 12 inches.
Not available for wire suspension electrodes.

Type AE-2 Holders — Molded of ABS corrosion-resistant thermoplastic material, these holders are ideal for use in applications involving control of many corrosive liquids. Designed to permit the use of either two solid rod or two wire suspension electrodes, they are supplied with flexible PVC water-tight covers to protect the lead wire junctions.

They have 303SS couplings with ¼-20 female thread for electrode connections.

MAXIMUM RATINGS
250 psi @ 100°F (38°C) 180°F (82°C) @ 0 psi

TYPE AE-2 HOLDER

For 2 Rod or Wire
Suspension Electrodes
2" NPT Pipe Thread Mounting

Catalog No. 6012-AE2 Old Part No. 12-034500

NOTE: The required electrodes must be ordered as separate items, see Catalog Setion 6013 for information.
Rod Electrodes — Type A rods are used.
Wire Suspension Electrodes — A wire connector is required for each wire suspension electrode.

CONDUIT ELECTRODE HOLDERS

Designed for use with B/W wire suspension electrodes, these versatile low-cost holders are recommended for underground drainage sumps, septic dosing tanks, open sumps and similar applications. Available in cadmium plated cast iron for general purpose applications, or rigid polyvinyl chloride for corrosive situations.

These holders are mounted by attaching to a length of standard conduit extending over the liquid being controlled. They have grommets for each wire suspension electrode, and come in two sizes to accommodate up to eight electrodes.

CATALOG NUMBER
6012 ——— C4I

	No. of Electrodes	Holder Material	Conduit Size	Connection Type	Old Part Number
C4I	1-4	Cast Iron	½" NPT	Threaded	12-056900
C4P	1-4	PVC	½" PVC	Cement	12-065400
C8I	1-8	Cast Iron	1" NPT	Threaded	12-081800
C8P	1-8	PVC	1" PVC	Cement	12-081900

NOTE: The required wire suspension electrodes must be ordered as separate items.

CORD GRIP ELECTRODE HOLDERS

Type CG1 with E-IP Electrode

B/W cord grip electrode holders provide a simple, low-cost means of sealing lead wire openings against leakage of gases and liquids in non-pressure applications requiring use of wire suspension electrodes. These include submersible pump installations with low level cutoff control, underground water storage tanks, covered sumps, and sewage pumping stations.

Made of aluminum machined for ½" pipe thread mounting, they are furnished with compressible Neoprene packing to support either one or two wire suspension electrodes.

Type CG2 with E-IS Electrodes

CATALOG NUMBER
6012 ——— CG1

	No. of Electrodes	Holder Material	Mounting Thread	Old Part Number
CG1	1	Aluminum	½" NPT	12-055900
CG2	2	Aluminum	½" NPT	12-056000

NOTE: The required wire suspension electrodes must be ordered as separate items.

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STANDARD ASSEMBLY

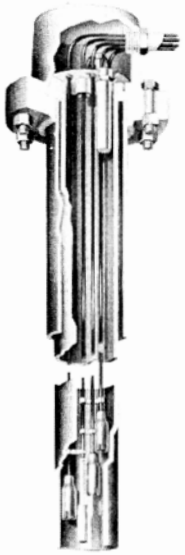
B|W ice-free electrode units are designed to provide positive, reliable pump control in areas where severe winter temperatures cause icing conditions which would normally interfere with or prevent proper pump operation.

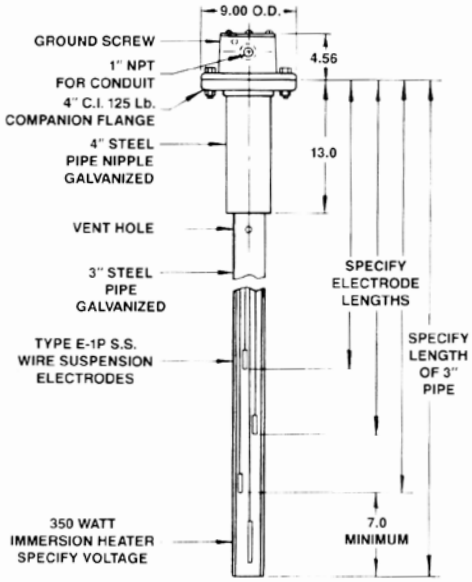
The assembly consists of a Type 6012-E554 cast iron flanged electrode holder threaded onto a 3" steel pipe and details are illustrated at the right. The thermostat is factory set to close at 32°F (0°C), and the heater will keep the water inside the 3" pipe free of ice even when heavy ice forms on the surface of the water surrounding the ice-free electrode assembly. The 4" pipe nipple with companion flange is provided to mount the unit. The nipple must be attached vertically to the tank top, and the rest of the assembly is then lowered and bolted into place.

When designing the control system, provisions must be made to cut-off the power to the immersion heater whenever the water level falls below the lowest electrode because the heater will burn out if it is energized when exposed to air.

A single pump, pump up system requires a B|W Type 1500-G relay with the NC contact controlling the pump, and the NO contact providing cut-off for the heater. See Catalog Sections 8040 and 8044 for information on standard and custom control panels.

TYPE IFW





6012—IFW—4—L1——8——X

CATALOG SECION

LINE VOLTAGE	
L1	115 Volt-50/60 Hz
L2	230 Volt-50/60 Hz

E-IF Old Part Number 12-041500

Other voltages not available.

The type IFW is for non-pressure applications. Contact factory if a pressure-tight ice-free unit is required.

SPECIFY QUANTITY AND LENGTH OF ELECTRODES
Type W2 E-1P 304SS Wire Suspension Electrodes 1 to 9 (Maximum)

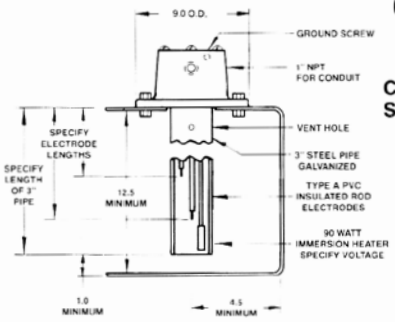
SPECIFY LENGTH OF 3 INCH PIPE — FEET
2 ft. (Minimum) to 6 ft.
7 ft. to 21 ft.
Over 21 ft.

If electrode lengths are not specified, they will be factory set at maximum length based on the 3" pipe length.

OPTIONAL FEATURES	
X	None
LP	Omit 3 inch Pipe Old Part No. 01-226000
LN	Omit 4 inch Pipe Nipple Old Part No. 09-155600
LF	Omit 4 inch Companion Flange, Bolts, & Nuts Old Part No. 04-105400

NOTE — if more than one item is to be omitted, include the symbol for each item deducted.
Example — LP-LN-LF

TYPE IFR



SHALLOW TANK ASSEMBLY

Some applications such as cooling tower basins require short electrode lengths, and as shown at the left, the Type IFR will mount directly on a tank top, or on a bracket inside the basin.

These assemblies have electrode plug and stainless PVC insulated solid rod electrodes. The 115 VAC heater is designed for operation in air and low level cut-off provision should not be provided.

6012—IFR—3—L1——26

CATALOG SECTION

LINE VOLTAGE	
L1	115 Volt-50/60 Hz

E-IF Old Part Number 12-074400

SPECIFY QUANTITY AND LENGTH OF ELECTRODES
Type A 316SS PVC Ins. Solid Rod Electrodes 1 to 4 (Maximum)

SPECIFY LENGTH OF 3 INCH PIPE-INCHES
12 inch minimum to 48 inch maximum

1. Other voltages not available.
2. Order cannot be processed without length of each electrode and length of the 3 inch pipe.
3. The Type IFR is for non-pressure applications. Contact factory if a pressure-tight ice-free unit is required.

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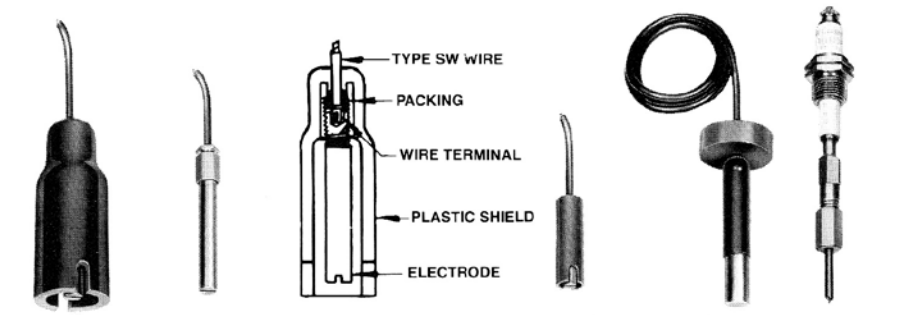
WIRE SUSPENSION ELECTRODES



6013W1 or W2 E-1P WITH SHIELD | 6013W3 or W4 E-1P LESS SHIELD | E-1P CUT-AWAY | 6013W5 or W6 E-1S WITH SHIELD | 6013W7 to W13 13-064700 | PLUG WITH CONNECTOR

Wire suspension electrodes are designed for use in applications requiring long lengths, or where limited head room prevents installation of solid rod electrodes. They can be used with all holders except Type CE-2 & 3. Electrode Types E-1P and E-1S are for use in water and non-corrosive liquids. Type 13-064700 is designed for corrosive liquids and is available with a variety of rod materials. Types E-1P and E-1S electrodes with molded plastic shields can be used at temperatures up to 150°F and other electrodes up to 190°F.

Type E-1P-Shielded: This electrode is approximately 4″ long and assembled in a molded plastic insulating shield 1 7/16″ in diameter. Designed for general purpose use, it is ideal for elevated tanks, sewage pumping stations, and deep well installations.

Type E-1P — Less Shield: This electrode is intended for applications where space prevents the use of other electrodes and where vertical spacing between electrodes is 4″ or more.

Type E-1S-Shielded: A 2″ long electrode assembled in a molded plastic shield 9/16″ in diameter. Ideal for use in submersible pump installations and other applications where little clearance is provided for installation.

Type 13-064700: This electrode is intended for corrosive liquids. It is 3″ long made from a ½″ diameter rod and available in any of the materials listed below. The type SW wire is attached at the factory and the connection is completely sealed with PVC and bonded to the insulation of the SW wire.

WIRE CONNECTOR: This adapter is necessary to attach the Type SW suspension wire to the ¼-20 female electrode holder connections. One is required for each wire suspension electrode used with electrode plugs, and Type E and Type AE-2 holders.

CATALOG NUMBER
6013——C——BR

Material	
Brass Old No. 12-038400	BR
303 SS Old No. 12-043800	SS

Type SW Suspension Wire: Designed to provide maximum strength and insulation, Type SW wire should always be used with B/W wire suspension electrodes to assure that a watertight seal is accomplished by the packing in the electrode. The wire is single conductor 18 gauge, 41 strand copper with 4/64″ vinyl insulation.

CATALOG NUMBER
6013—SW—10

Specify Length In Feet Old No. 01-130500	

6013—W1

CATALOG SECTION

	ELECTRODE TYPE	ELECTRODE MATERIAL	OLD PART NO.
W1	E-1P With Shield	Brass	13-020600
W2	E-1P With Shield	303 Stainless	13-020700
W3	E-1P Less Shield	Brass	13-052700
W4	E-1P Less Shield	303 Stainless	13-052600
W5	E-1S With Shield	Brass	13-022000
W6	E-1S With Shield	303 Stainless	13-024300

These electrodes are field assembled and the required amount of Type SW wire must be ordered as a separate item. See above.

NOTE — When wire suspension electrodes are to be used with electrode plugs, or Type E or Type AE-2 electrode holders, wire connectors must also be ordered for each electrode. See above.

6013—W7——10

CATALOG SECTION

	ELECTRODE TYPE	ELECTRODE MATERIAL	OLD PART NO.
W7	13-064700 With SW Wire	316 Stainless	13-064702
W8	13-064700 With SW Wire	Monel	13-064703
W9	13-064700 With SW Wire	Nickel	13-064704
W10	13-064700 With SW Wire	Carpenter 20	13-064705
W11	13-064700 With SW Wire	Hastelloy B	13-064707
W12	13-064700 With SW Wire	Hastelloy C	13-064706
W13	13-064700 With SW Wire	Titanium	13-064709

	Type SW Wire Length In Feet

These electrodes come complete with the Type SW wire permanently attached to the electrode. Lengths must be specified when ordering.

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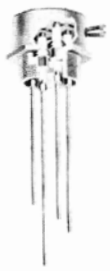
ELECTRODE MATERIAL SELECTION

The chart below suggests electrode material for some typical liquids. Electrode corrosion is difficult to predict because the rate of corrosion is effected by many factors such as: concentration, temperature and impurities. Therefore, this information should be used as a general guide, and the final choice should be determined from actual application conditions based on previous experience and knowledge.

ELECTRODE MATERIAL	TYPICAL LIQUID TO BE CONTROLLED
Brass	Soft Water, Condensate
316 SS	Water, Sewage, Beer, Alcohol, Food Products, Chemicals, Many Mild Acids
Monel	Acetic Acid, Sea Water
Nickel	Boric Acid, Calcium Hydroxide
Carpenter 20	Sulphuric Acid, Alum Solutions
Hastelloy B	Hydrochloric Acid
Hastelloy C	Hydroflouric Acid
Titanium	Phosphoric Acid, Brine Ferric Chloride, Hot Nitric Acid
Carbon Tip	Hydrochloric Acid Carbonated Water

Contact Factory for specific recommendations.

SOLID ROD ELECTRODES

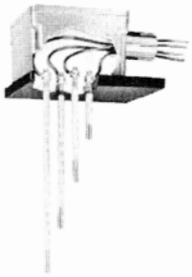


6012E4 HOLDER

6013 ELECTRODE PLUG

AE-2 HOLDER

6012-CE2 HOLDER TYPE B RODS



6012-FR-56 HOLDER TYPE D RODS

TYPE A RODS

Solid rod electrodes are generally used where relatively short lengths of 6 feet or less are required. Care should be exercised when specifying lengths over 6 feet. Longer rods and those installed horizontally should be insulated. After cutting insulated rods, strip about 1 inch of insulation off lower end to expose the bare rod.

TYPE A electrode rods are ¼" diameter and have ¼-20 thread for use with electrode plugs, and Type E and Type AE-2 electrode holders. A boot made of the sheath material is furnished to protect and insulate the lower side of the electrode plug.

TYPE B electrode rods are ¼" diameter and are tapped 6-32 for use only on Type CE-2 and CE-3 holders. Lengths over 12 inchs should be insulated and lengths over 30 inches are not recommended.

TYPE C electrode rods are ¼" diameter and have the upper end machined with a shoulder and 10-24 thread to assemble into Type KF holders.

TYPE D electrode rods are ¼" diameter are similar to Type C except the upper end is machined to a length that fits only Type FR holders.

6013—SS—P——A—4

CATALOG SECTION

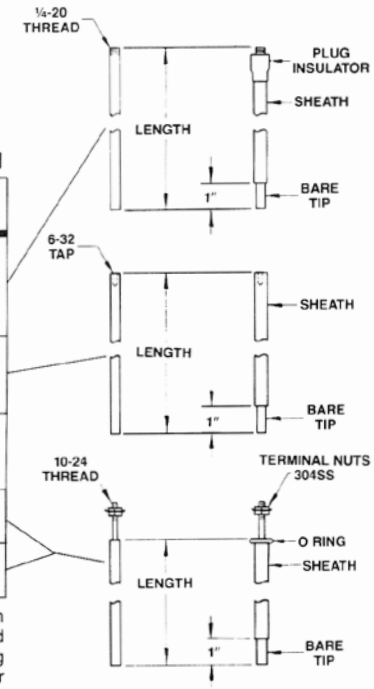
	INSULATION MATERIAL
X	Bare Rod
P	PVC Sheath Max. Temp. 190°F (88°C)
T	Teflon Sheath Max. Temp. 550°F (288°C)
PC	Carbon Tip Installed On PVC Insulated Rod
TC	Carbon Tip Installed On Teflon Insulated Rod

	ROD MATERIAL
BR	Brass
SS	316 Stainless
MO	Monel
NI	Nickel
CA	Carpenter 20
HB	Hastelloy B
HC	Hastelloy C
TI	Titanium

ROD TYPE & LENGTH

	Rod Length In Feet See Note Below
A	Has ¼-20 thread for use on Type E or AE-2 holders and electrode plugs.
6B	Has 6-32 tap for use on Type CE-2 & CE-3 holders.
8B	Has 8-32 tap for use on gland electrode assemblies.
C	Rod machined for attaching to Type KF holders.
D	Rod machined for attaching to Type FR holders.

NOTE: Standard stock rods are furnished in even foot increments up to 10 ft. long, and must be field cut for intermediate operating lengths. Contact Factory for pricing on other lengths and materials.



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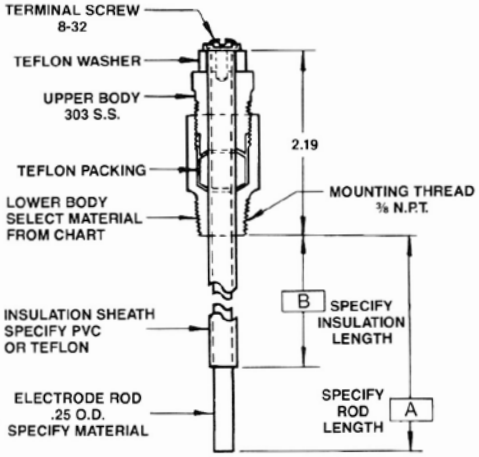
GLAND PLUG AND ROD ASSEMBLY

The packing gland construction of these units provides additional strength for electrodes on applications where there is vibration, shock or side thrust against the electrode. Installations include detecting the presence or absence of fluids in shipboard bilge discharge lines, or coal slurry pipelines.

The lower plug body is available in most of the same materials as the electrode rods so that these assemblies are quite suitable for many corrosive conditions. With teflon insulated rods they are rated for use up to 250 psi and 400°F (204°C).

These gland plug electrode assemblies can also be used in the Type E electrode holders instead of the standard electrode plugs.

The gland plug assemblies are separately ordered for field assembly.



CATALOG NUMBER

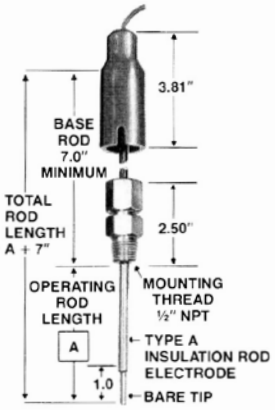
6013—GP—CA—SS—P—8B—4

	LOWER BODY MATERIAL	OLD PART NUMBER
303	303 Stainless	12-065800/12-065900
316	316 Stainless	12-074600
MO	Monel	12-075800
NI	Nickel	12-079600
TI	Titanium	12-078000

Electrode Rod Details
See Previous Page

A dimension is electrode length
B dimension is insulation length

ADJUSTABLE GLAND ELECTRODE ASSEMBLY



B/W adjustable gland electrode holders are designed for use in applications that require occasional changing of the high or low level control settings. Typical installations include conveyor feed, liquid proportioning, and container filling machines.

Made of 303 stainless steel with positive pressure-tight ½" pipe thread mounting plus Teflon or Neoprene insulation and packing. These holders are used with insulated solid rod electrodes of any desired length. To adjust level settings, simply loosen the top of the holder and slide the electrode up or down to required depth. Electrodes must be insulated over the full range of adjustability.

CATALOG NUMBER

6013—AGP—15—SS-P

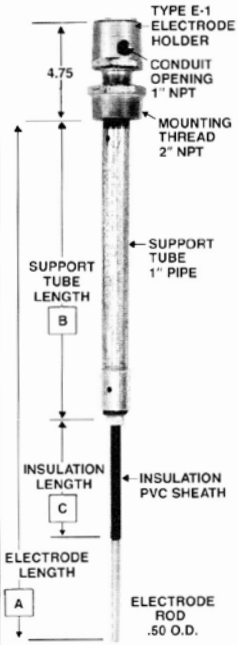
	Specify rod material and insulation material
	Type SW Wire Length In Feet

The A dimension operating electrode rod length must be furnished with order.

	DESCRIPTION
AGP	Adjustable Gland & Rod Assy. Old Part No. 12-057000

NOTE
See Catalog Section 6013 page 13 for selection of rod materials. ADD price of insulated rod to total.

RUGGEDIZED ELECTRODE ASSEMBLY



These Type REA electrode assemblies are very strong for use on heavy solutions, particularly when they are being agitated with a mixer. Applications include clay or starch solutions used for sizing in the manufacturing of paper products.

The Type E-1 holder provides water-tight protection for the electrode connection and is available in cast iron, brass or 316 S.S. The support tube which provides strength to prevent deflection of the ½" OD stainless rod is available in galvanized steel or other materials such as stainless steel.

CATALOG NUMBER
6013 — REA
Old Part No. 12-070600

When placing an order or requesting a quotation, specify the required lengths for dimensions A, B, & C, and the type of material for the holder and support tube.

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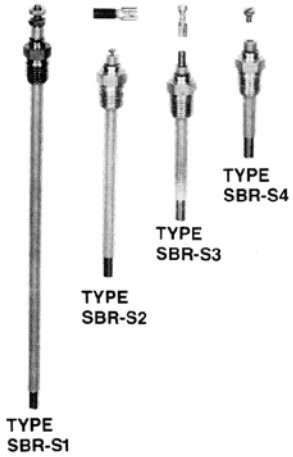
SMALL BUSHING AND ROD ASSEMBLIES



Ametek offers a variety of these small electrode assemblies to meet special OEM situations for single electrodes. The bushing has a 1/4" NPT pipe thread for pressure-tight mounting and is available in either cadmium plated steel or 316 S.S. The electrode rod is 1/4" O.D. and must be insulated for at least 1" below the bushing. The available PVC or teflon insulated rod materials are listed on page 35. There is a choice of four methods to connect the electrode lead wire.

CATALOG NUMBER
6013——SBR——S1——S

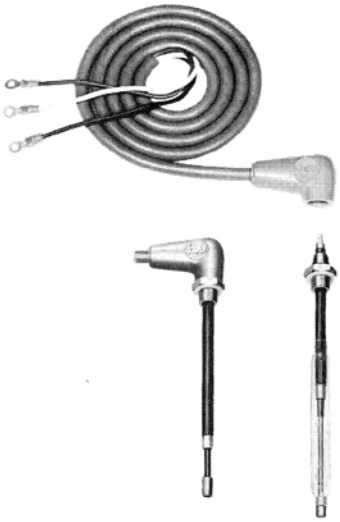
	TYPE OF WIRE CONNECTION
S1	Double Nut
S2	Push-On Spade
S3	Push-On Bayonet
S4	6-32 Screw

Minimum Order
25 pieces

For a quotation advise, type of wire connection, bushing material, material and length of insulated rod.

CONCENTRIC ELECTRODE ASSEMBLIES

These assemblies are primarily for OEM applications requiring two short electrodes and where space is limited to install them. While developed for carbonator level control, they are suitable for any small tank for use up to 150 psi and 170°F (77°C). The mounting bushing is made of 316 S.S. with ½"-20 machine thread, and a nylon gasket is provided. The snap-on cord set has a three conductor type SJT cord which provides ground connection to the mounting bushing, as well as the two electrode leads.



For a quotation advise the length of both electrodes, the length of the cord set, and the type of termination for the wire leads.

CATALOG NUMBER
6013 — CEA — S

Minimum Order
25 pieces

SPACERS FOR INSULATED ELECTRODE RODS

BIW rod spacers are used to stiffen long electrode rod assemblies in those situations where movement of the liquid would tend to deflect the rods. They must never be attached to bare electrode rods because liquid on the surface of the spacer could short between electrodes preventing proper operation of the BIW control relays.

The PVC spacers include heat shrinkable PVC sleeves for attaching them to PVC insulated rods. The teflon spacers have heat shrinkable teflon sleeves to secure them to teflon insulated rods.

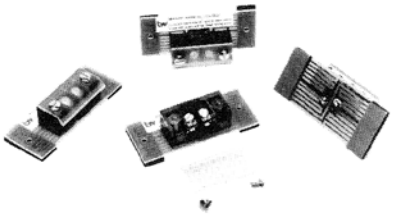
CATALOG NUMBER
6013——RS2——P

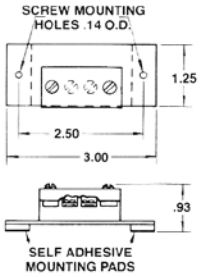
	SPACER DESCRIPTION	
	Number Of Rods	For Use With Holder Type
RS1	2	E-2
RS2	3	E-3
RS3	4 to 7	E-4 to E-7
RS4	2	KF-1
RS5	2 to 4	KF-2 or KF-2JB
RS6	2 to 7	KF-3 or KF-4
RS7	2 to 5	FR-56

	INSULATION MATERIAL
P	PVC
T	Teflon

NOTE
Contact factory for quote on special assemblies consisting of electrode holders with insulated electrode rods and spacers attached.

MOISTURE SENSOR





The Type MSA moisture sensor is a compact low cost device used to detect water leakage into areas such as computer room subfloors, communication vaults, below grade ductwork, floors in basements, storage areas or equipment rooms. It is easily attached to a floor or wall surface by the self adhesive strips or the mounting screws provided.

While designed as a sensor for the Series 41 Alarm Panel described in Catalog Section 8041, they can also be used to operate any of the BIW control relays. The relay or alarm is actuated when moisture bridges adjacent printed circuit paths on the underside of the sensor.

CATALOG NUMBER
6013-MSA-1
Old Part No. 13-074400

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APPLICATIONS

B|W Float Switches are designed to be suspended vertically into the liquid being controlled. A movable weight can be attached to the multi-conductor suspension cord which keeps the cord taut, and also determines the tether length of the float.

Two basic types of switches can be provided. A Wide Angle Switch (Product Code A) which operates between 60°-90° or, Narrow Angle Switches (Product Codes G, L & W) which operates at typically 10°-18°.

B|W Float Switches can be provided with the following contact configuration.

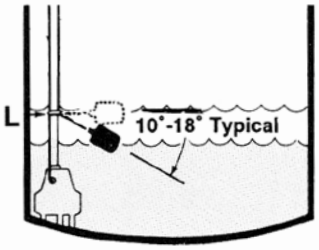
A — Normally open for pump down operation.

B — Normally closed for pump up operation.

C — Single pole double throw for either operation.

Narrow Angle Switches

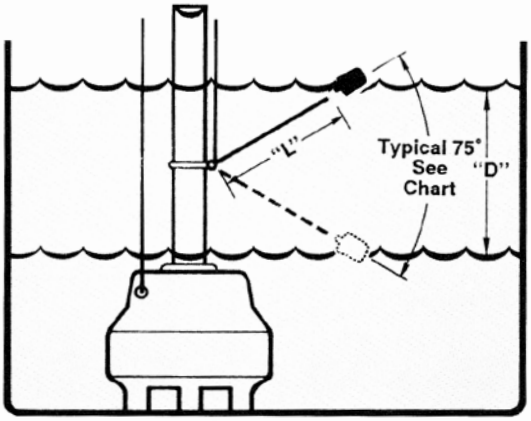
Catalog Number Code	Typical Switch Operating Angle
7010-G	15°
7010-L	10°
7010-W	18° SPDT



Note: Minimum tether length is 2 inches

All operating angles shown are approximate typical angles and are based on switch tests at full rated load.

Wide Angle Switch Catalog No. 7010-A



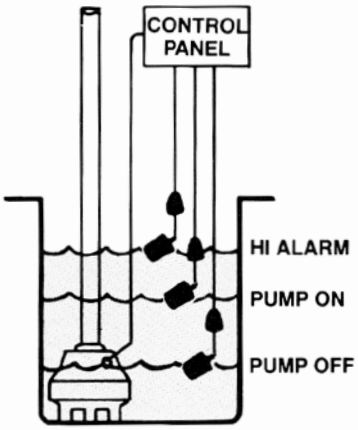
Float switch operates at typically 80°

"L" = Tether length

"D" = Switch operating differential as a function of tether length

"L"	3	4	6	8	10	12
"D"	7	8	11	14	17	21

Approximate length in inches



BIW Controls can provide the complete control system for a multiple float application including NEMA 1, 4 or 12 enclosures, disconnect switch, control transformer, relays, motor starters, alternators, alarms, etc.

With over 60 years of experience in liquid level controls, our engineers can assist you to obtain the most economical and reliable system that's best for you.

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CATALOG NUMBERING SYSTEM

7010 — G — 4 — A — 20

Catalog Section

	Float Size
4	2.8" Diameter

	Contact Arrangement
A	N.O. — Normally open for Pump Down (A, G, or L switch only)
B	N.C. — Normally closed for Pump Up (A switch only)
C	S.P.D.T.— Single Pole Double Throw for both pump-up or pump-down (W switch only)

	Switch Type		
	Running Current (Amps)		Typical Operating Angle
	120 VAC	240 VAC	
	Wide Angle (N.O. or N.C.) Mechanical Style		
A	13.0	13.0	75°
	Narrow Angle (N.O. Only)		
G	1.0	0.7	15°
L	13.0	11.0	10°
	Narrow Angle (SPDT Only)		
W	13.0	11.0	18°

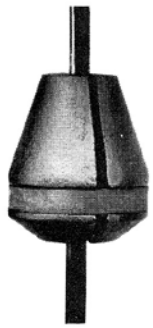
} S.P.D.T. Contact Configuration

RED — BLACK — WHITE

	Cord Length
20	20 Feet
*	Specify Additional Length Required

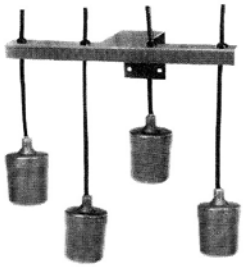
Note: Additional length wire is spliced to existing float wire. Special epoxy heat shrink tube is used to assure watertight seal.

ACCESSORIES



Float Switch Weight (20 ounces)
Part No. 12085000

1/2" Cord Grip for Single Float Switch
Part No. 12084900



Wall Mount Bracket For up to 4 Float Switches
Part No. 12085100

Wall Mount Bracket For Single Float Switch
Part No. 12085200

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Series 7010
Liquid Level Float Switches

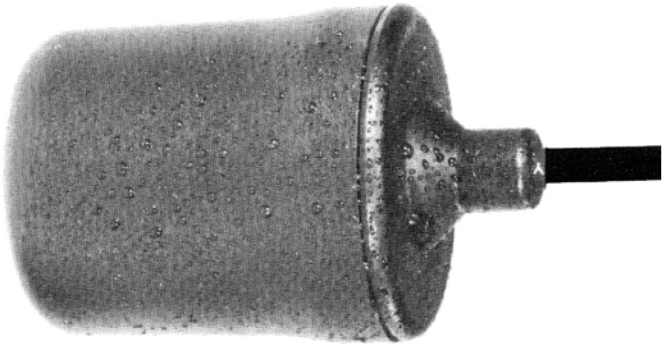
FLOAT SWITCHES

DESCRIPTION

The BIW Float Switches are tilt actuated liquid level controls, designed to operate pumps, valves, multiple alternators, relays, contactors, alarms and similar equipment for industrial and commercial use.

A hermetically sealed, axially nonposition-sensitive mercury switch is used in the narrow angle option, while the wide angle option uses a mechanical switch inside the float. These floats provide a reliable, long-lasting level control suitable for most liquid environments up to 160°F.

The BIW Float Switches provide an ideal pilot device for the control of all BIW relays and control panels. The polypropylene float, PVC cable, and hermetically sealed mercury switch provide an economical liquid level solution for controlling sewage, effluent, many chemical solutions, as well as liquids in other hostile environments containing oil, grease or other similar industrial and municipal wastes where dependable liquid level control is essential.



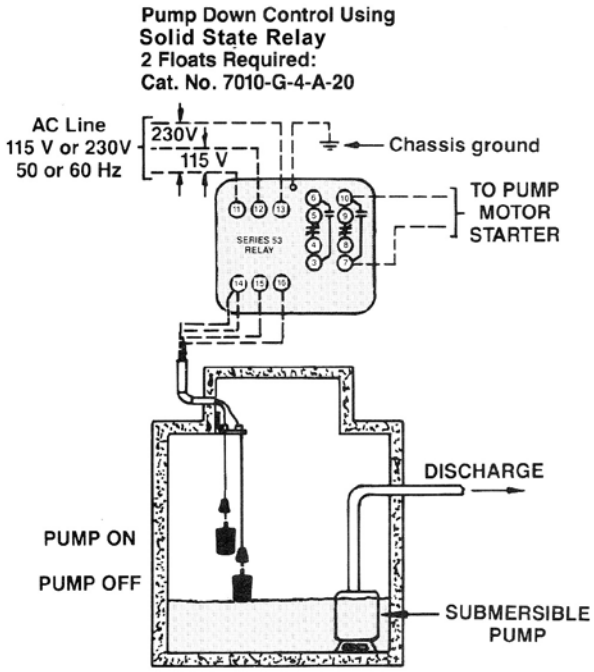
SPECIFICATIONS

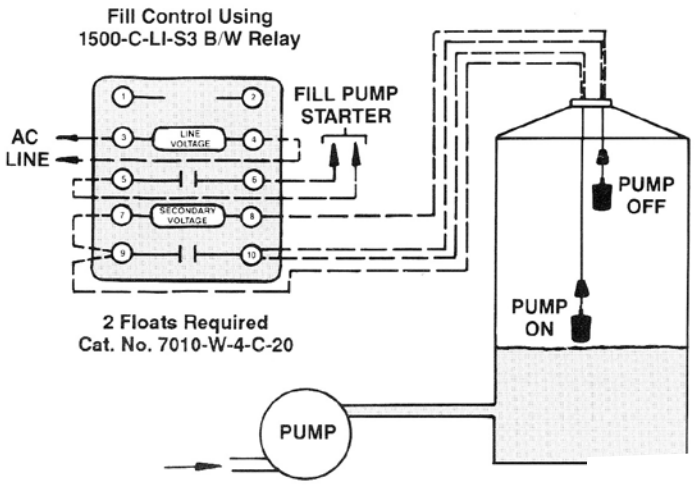
Float:	Chemically Stable Polypropylene
Float Dimensions:	Length 3.4" Diameter 2.8" Strain Relief 1.0"
Cord:	16/3 for S.P.D.T. 16/2 for either N.O. or N.C. Operation
Cord Length:	20 ft.
Operating Temperature:	32°F to 160°F Materials are rated to 221°F
Operating Pressure:	Pressure tested to 60 feet of water (26 psi.)

Switch Ratings:

Switch Code		Running Current (Amps) at 120 VAC	Running Current (Amps) at 240 VAC
Wide Angle	A*	13.0	13.0
Narrow Angle (N.O.)	G L	1.0 13.0	.7 11.0
Narrow Angle S.P.D.T.	W	13.0	11.0

* Mechanical Switch





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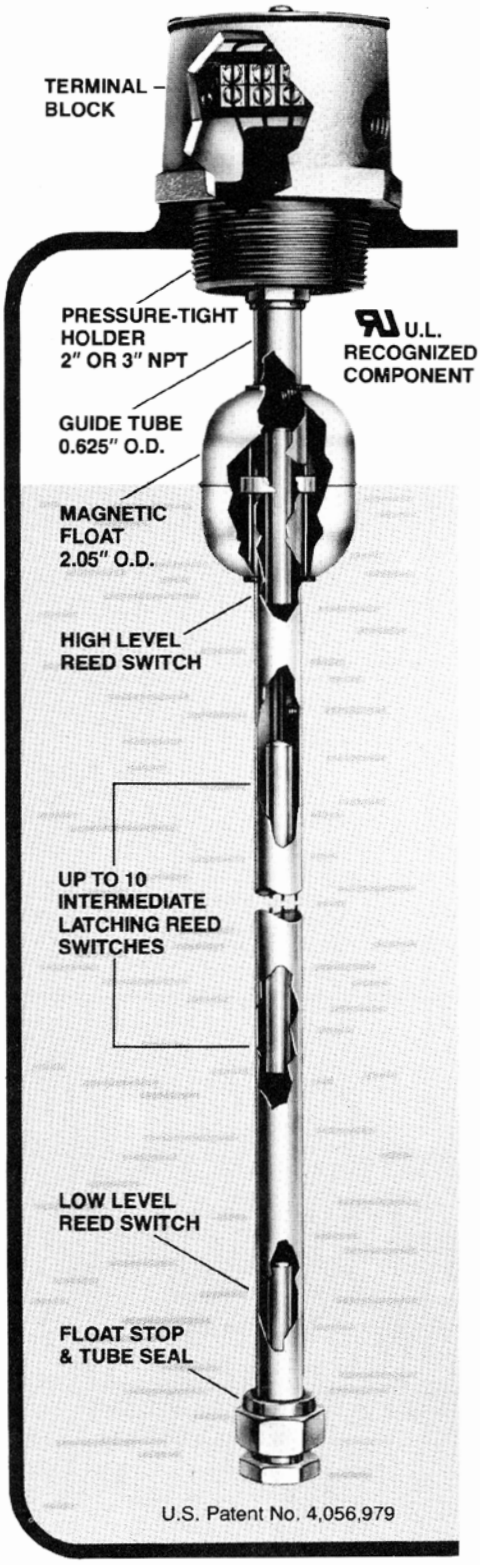
Series 7014
Unifloat™ Level Sensors



U.S. Patent No. 4,056,979

DESCRIPTION

The B|W Unifloat level sensing system was developed especially to permit simple, low-cost installation and ease of adjustment in service for a broad range of applications requiring accurate multiple function/multiple level control of any type of liquid.

FOUR BASIC COMPONENTS

As illustrated at left, this advanced new system consists of just four basic components:

(1) A single MAGNETIC FLOAT that is free to travel up and down with the rise and fall of liquid. Standard material is 316 S.S.

(2) A GUIDE TUBE of any practical length with one float stop at the bottom. Available in brass or 316 S.S.

(3) A pressure tight WEATHER-PROOF holder available in cast iron or 316 S.S. to support the guide tube from the top of the tank.

(4) Up to 12 REED SWITCHES suspended at any desired operating levels in the guide tube. Two types of the B|W patented magnetically latching reed switches are available.

Operating Viscosity
Up to 1500 CP (centipose)
Up to 6000 SSU (saybolt universal seconds)

Operating Pressures
Minimum
Vacuum
To 14.7 psi
Maximum
500 psi
3450 kPa

Operating Temperatures
Minimum
0°F
−19°C
Maximum
250°F*
121°C*

CHOICE OF TWO REED SWITCHES

CONTACT RATINGS

MAXIMUM VOLTS	MAXIMUM CURRENT	
	A.C.	D.C.
25	440 ma	400 ma
50	220 ma	200 ma
120	90 ma	80 ma

TYPE C REED SWITCH
One lead with grounded contact

Up to 7 in 2 inch holder.
Up to 12 in 3 inch holder.

Common side of each switch must connect to grounded side of the same power supply.

Ideal for use with B|W control relays.

Part #14000131

TYPE I REED SWITCH
Two leads with isolated contact

Up to 4 in 2 inch holder.
Up to 6 in 3 inch holder.

Individual switches can be used in different circuits.

Greater flexibility on applications with conventional relays and devices.

Part #14000151

*Consult Factory For Tempertures over 250°F

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FEATURES AND ADVANTAGES:

Because of its inherent simplicity, the B|W **Unifloat™ Level Sensor** concept provides many features and advantages not offered by other float type level sensing devices. Among them:

Fewer Parts/Lower Costs—Use of one free-moving float to actuate up to 12 hermetically sealed and encapsulated reed switches eliminates expense and problems involved in mounting a separate float plus float stops at each operating level.

Ease of Installation— Suspending all reed switches on a common circuit return line simplifies assembly and installation. Just slide switches up or down to desired control levels and position them in guide tube. Then mount the tube and its supporting holder through top of the tank, and make electrical connections to B|W relays. Because control circuit voltage between reed switches and relays is normally quite low, no special wiring is required. A numbered terminal block in the holder permits quick, easy field connections to the external relays, alarms, valves or whatever is used to perform the desired functions.

Simple Level Adjustment— Unifloat also permits quick and easy adjustment of control levels if required to meet changing operating conditions. Simply remove the internal terminal block and reed switch assembly through the top of the holder. Add, remove or change position of switches to any new levels desired and replace in the housing. No need to break any tank connections or disturb any material in the tank.

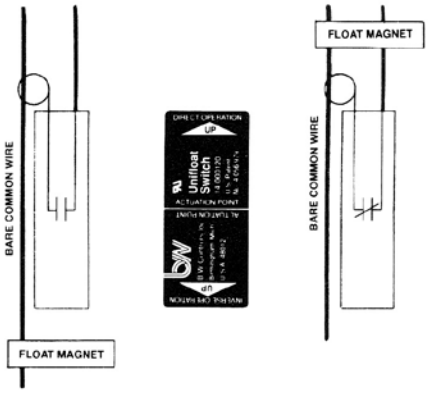
Greater Reliability—Power failures are not supposed to occur. But occasionally they do. No problem with **Unifloat.** Because, as the free-moving float passes each control level, the unique latching feature of the switches in the guide tube assures detection of changing level even during periods of no power, plus immediate resumption of normal operation when power is restored.

Greater Versatility — Another exclusive feature of B|W **Unifloat** systems is the fact that each reed switch can be used for either DIRECT or INVERSE operation. In other words, the operation of each switch can be quickly changed from NO to NC by simply reversing position of the reed switch instead of reversing the magnetic float.

DIRECT OPERATION

The reed switch contact is NORMALLY OPEN and CLOSES ON RISING LEVEL.

With the float magnet below the switch actuation point, the contact is open until rising level causes the float to raise to the actuation point. The contact then closes and because of the patented B|W magnetic latching feature, it will remain closed until falling level brings the float back down and past the actuation point.

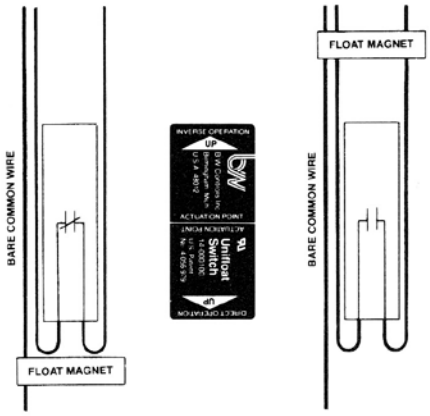


The Type C Switch is shown.
It attaches to the common wire with a spring clip.

INVERSE OPERATION

The reed switch contact is NORMALLY CLOSED and OPENS ON RISING LEVEL.

With the float magnet below the switch actuation point, the contact is closed and because of the patented magnetic latching feature, will remain closed until rising level causes the float to raise past the actuation point. The contact will then remain open until falling level brings the float back down to the actuation point causing the contact to latch in the closed position.



The Type I switch is shown.
It attaches to the common wire with plastic tape.

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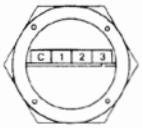
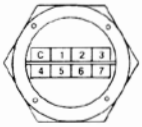
7014 — C — 3

CATALOG SECTION

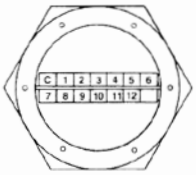
TERMINAL BLOCK ARRANGEMENTS FOR TYPE C REED SWITCHES
(All contacts have a common ground)



2 INCH NPT HOLDER FOR 1 TO 3 SWITCHES

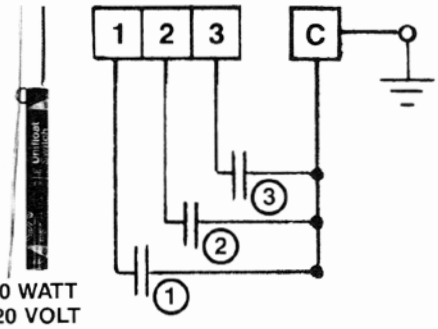


2 INCH NPT HOLDER FOR 4 TO 7 SWITCHES



3 INCH NPT HOLDER FOR 8 TO 12 SWITCHES

TYPE C REED SWITCH
With Common Grounded Connection



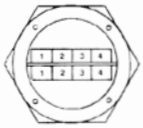
10 WATT
120 VOLT

	NUMBER OF SWITCHES	
1	1 magnetically latched reed switches	2 IN. HOLDER
2	2 magnetically latched reed switches	
3	3 magnetically latched reed switches	
4	4 magnetically latched reed switches	
5	5 magnetically latched reed switches	
6	6 magnetically latched reed switches	
7	7 magnetically latched reed switches	
8	8 magnetically latched reed switches	3 IN. HOLDER
9	9 magnetically latched reed switches	
10	10 magnetically latched reed switches	
11	11 magnetically latched reed switches	
12	12 magnetically latched reed switches	

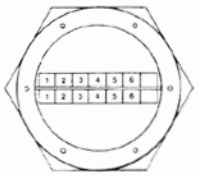
7014 — I — 2

CATALOG SECTION

TERMINAL BLOCK ARRANGEMENTS FOR TYPE I REED SWITCHES
(Isolated Contacts)

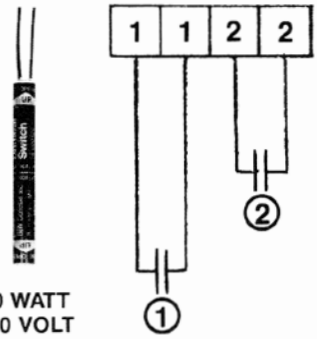


2 INCH NPT HOLDER FOR 1 TO 4 SWITCHES



3 INCH NPT HOLDER FOR 5 TO 6 SWITCHES

TYPE I REED SWITCH
With Isolated Contact



10 WATT
120 VOLT

	NUMBER OF SWITCHES	
1	1 magnetically latched reed switches	2 IN. HOLDER
2	2 magnetically latched reed switches	
3	3 magnetically latched reed switches	
4	4 magnetically latched reed switches	
5	5 magnetically latched reed switches	3 IN. HOLDER
6	6 magnetically latched reed switches	

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Unifloat® CATALOG NUMBERING SYSTEM

A — 6 — SS

See page 54 for information regarding switch settings and direct or inverse operation.

	GUIDE TUBE MATERIAL
B	BRASS
SS	316 STAINLESS STEEL

	HOLDER MATERIAL & SIZE
A	Cast Iron 2″ & 3″ NPT
B	316 Stainless Steel 2″ NPT 1-7 Switches
C	316 Stainless Steel 3″ NPT 8-12 Switches

	Length of Tube For Reed Switch Set Lengths (Dimension "L" in feet)
1	1 Foot
2	2 Feet
3	3 Feet
4	4 Feet
5	5 Feet
6	6 Feet
7	7 Feet
8	8 Feet
9	9 Feet
10	10 Feet
11	11 Feet
12	12 Feet

Consult factory for lengths and/or materials not listed.

B — 10 — SS

See pages 54 & 55 for information regarding switch settings and direct or inverse operation.

	GUIDE TUBE MATERIAL
B	BRASS
SS	316 STAINLESS STEEL

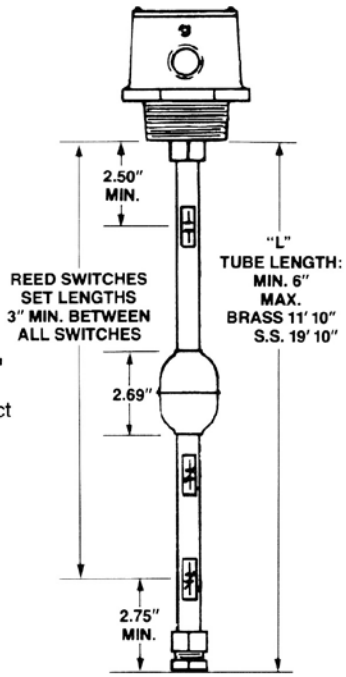
	HOLDER MATERIAL & SIZE
A	Cast Iron 2″ & 3″ NPT
B	316 Stainless Steel 2″ NPT 1-4 Switches
C	316 Stainless Steel 3″ NPT 5-6 Switches

	Length of Tube For Reed Switch Set Lengths (Dimension "L" in feet)
1	1 Foot
2	2 Feet
3	3 Feet
4	4 Feet
5	5 Feet
6	6 Feet
7	7 Feet
8	8 Feet
9	9 Feet
10	10 Feet
11	11 Feet
12	12 Feet

Consult factory for lengths and/or materials not listed.

ORDERING INFORMATION

1. Specify Unifloat with a complete catalog number.
2. Specify switch setting information by including a switch specification chart from page 55.
3. Provide details on the nature of the liquid being controlled.



TUBE LENGTH: Tube will be cut 2.75″ longer than maximum switch set length unless otherwise specified.

NOTES

1. If switch setting information is not included with order, all switches will be installed for direct operation and set at maximum lengths.
2. Unless otherwise specified, factory assembled Unifloats will have the switches set for actuation based on 1.0 S.G. for water.

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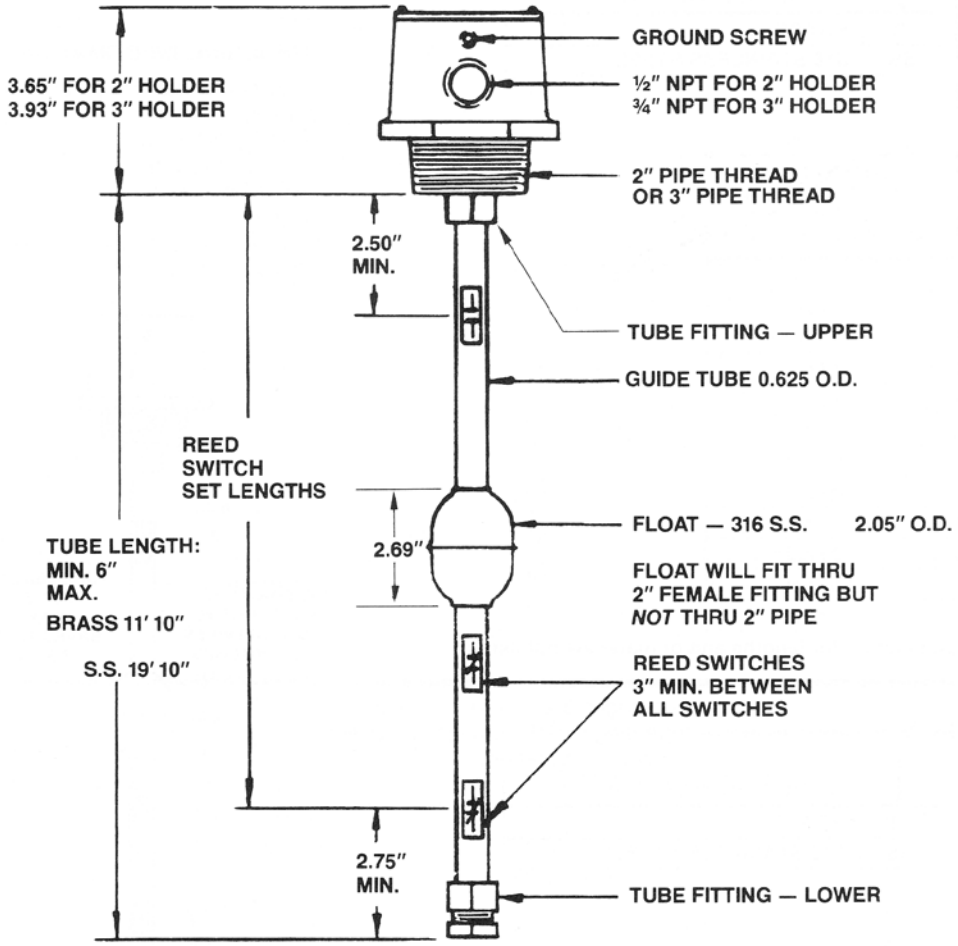
DIMENSIONS AND DETAILS



Operating Pressures

Minimum	Vacuum to 14.7 psi
Maximum	500 psi 3450 kPa

Operating Temperatures

Minimum	0°F –19°C
Maximum	250°F* 121°C*

*Consult Factory For Temperture over 250°F

Operating Viscosity

Up to 1500 CP
Up to 6000 SSU

IMPORTANT: The reed switches are rated for 10 watts and the maximum voltage and current load must not be exceeded.

Volts	Maximum Current	
	AC	DC
25	440 MA	400 MA
50	220 MA	200 MA
120	90 MA	80 MA

Just before installation into the tank, slide the float up and down the full length of tube to set the switches in their normal condition.

REED SWITCH SETTINGS

Each reed switch is marked with the actuation point and the differential travel is 0.1 inch. Switch actuation will depend on the actual specific gravity of the liquid being controlled, and unless otherwise specified, factory assembled units will have switch settings based on water with a specific gravity of 1.0. Adjustment for other specific gravities is shown in the table.

SPECIFIC GRAVITY ADJUSTMENT

S.G.	Subtract from Length	S.G.	Add to Length
1.5	0.37 in.	1.0	None
1.4	0.31 in.	0.9	0.12 in.
1.3	0.25 in.	0.8	0.27 in.
1.2	0.18 in.	0.7	0.48 in.
1.1	0.10 in.	*0.65	0.62 in.
1.0	None	*Recommended Minimum	

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REED SWITCH SPECIFICATION CHARTS

TYPE C REED SWITCH

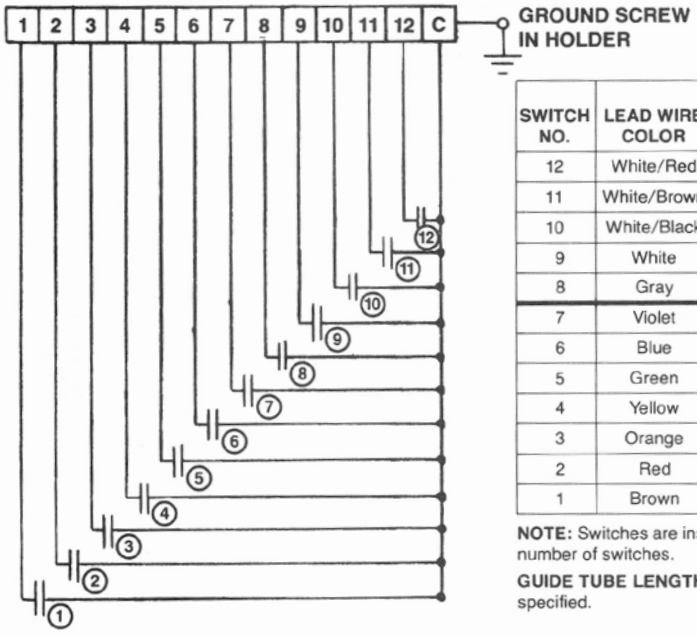
(All contacts have a common ground)
Maximum rating 10 watts at 120 volts AC or DC.

BARRIER TERMINAL BLOCK IN HOLDER

No. 6 Screw — Saddle Clamp
Max. Wire Size: #14 A W G

ONE LEAD WITH GROUNDED CONTACT

Up to 7 switches in 2 inch holder.
Up to 12 switches in 3 inch holder.
Common side of each switch must connect to grounded side of the same power supply.



SWITCH NO.	LEAD WIRE COLOR	TERMINAL NO.	FUNCTION	SWITCH OPERATION		SET LENGTH (INCHES)
				DIRECT	INVERSE	
12	White/Red	12				
11	White/Brown	11				
10	White/Black	10				
9	White	9				
8	Gray	8				
7	Violet	7				
6	Blue	6				
5	Green	5				
4	Yellow	4				
3	Orange	3				
2	Red	2				
1	Brown	1				

NOTE: Switches are installed with No. 1 as the lowest in the guide tube and working upward using the required number of switches.

GUIDE TUBE LENGTH: Tube will be cut 2.75" longer than the maximum switch set length unless otherwise specified.

TYPE I REED SWITCH

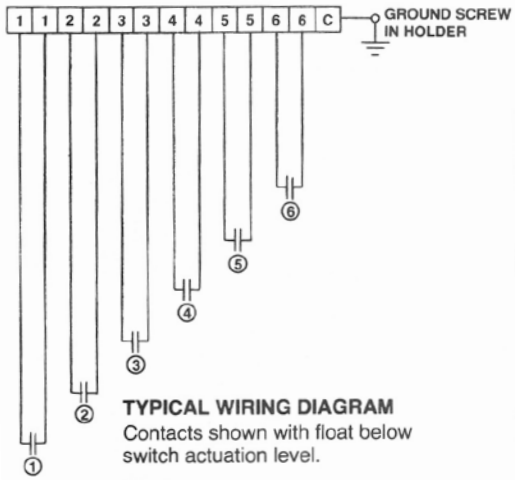
(All isolated contacts)
Maximum rating 10 watts at 120 volts AC or DC.

BARRIER TERMINAL BLOCK IN HOLDER

No. 6 Screw — Saddle Clamp
Max. Wire Size: #14 A W G

TWO LEADS WITH ISOLATED CONTACT

Up to 4 switches in 2 inch holder.
Up to 6 switches in 3 inch holder.
Individual switches can be used in different circuits.



TYPICAL WIRING DIAGRAM
Contacts shown with float below switch actuation level.

SWITCH NO.	LEAD WIRE COLOR	TERMINAL NO.	FUNCTION	SWITCH OPERATION		SET LENGTH (INCHES)
				DIRECT	INVERSE	
6	Blue	6				
5	Green	5				
4	Yellow	4				
3	Orange	3				
2	Red	2				
1	Brown	1				

NOTE: Switches are installed with No. 1 as the lowest in the guide tube and working upward using the required number of switches.

GUIDE TUBE LENGTH: Tube will be cut 2.75" longer than the maximum switch set length unless otherwise specified.

Above contacts shown as direct operation. For inverse operation show contact closed.

⊣⊢ Direct Operation. ⊣⊢ Inverse Operation.

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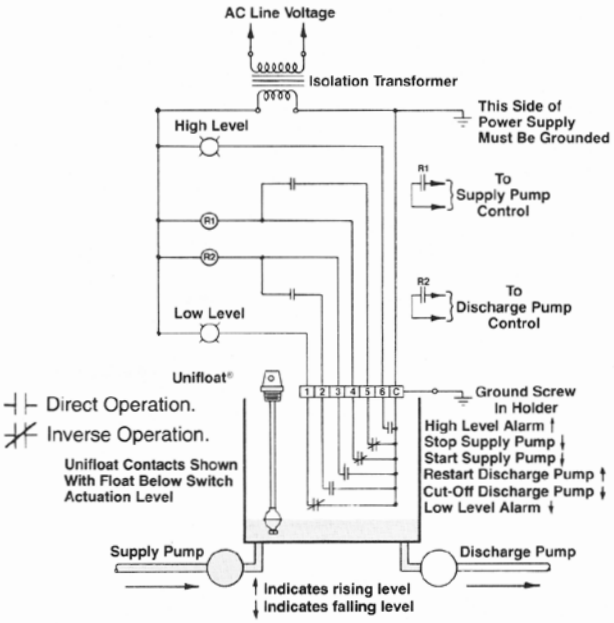
OTHER APPLICATIONS

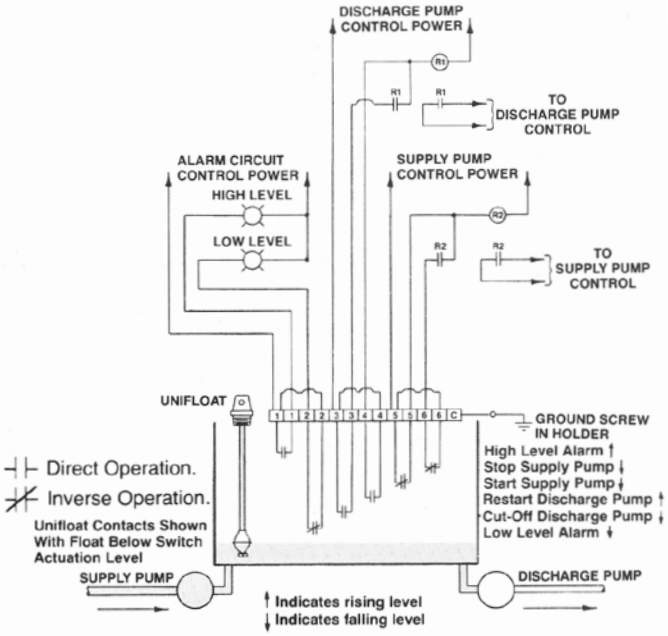
WITH TYPE C REED SWITCH
Having Common Grounded Contact

The line diagram below shows the wiring method recommended when operating conventional relays and devices rather than B/W relays. To meet UL requirements, the control power must be from an isolation transformer with the common side grounded. This means that the Unifloat switches are connected in the grounded side of the relay coils rather than the hot side. If this causes a circuit design problem, then the Type I isolated contact reed switches should be used in the Unifloat.



WITH TYPE I REED SWITCH
Having Isolated Contact

The versatility of the Type I reed switch is shown in the line diagram below. They can be wired in the hot side of the control voltage and be independently wired in various control circuits. While a ground screw is provided in the holder, there is no need to ground the reed switch leads. Contacts are rated 10 watts at up to 120 volts AC or DC and the maximum voltage and current ratings must not be exceeded.



ACCESSORIES

MOUNTING FLANGES	Cast Iron 125 Lbs. Plain Face	304 SS 150 Lbs. Stainless Steel Raised Face	316 SS 150 Lbs. Stainless Steel Raised Face
2 x 6 Companion, 2 inch (Weight 5 lbs.)	04186500	04291013	04291002
2 x 7½ Reducing, 2 x 3 inch (Weight 9 lbs.)	04186400	04291113	–
2 x 9 Reducing, 2 x 4 inch (Weight 15 lbs.)	04193600	04294113	04587275
3 x 7½ Companion, 3 inch (Weight 9 lbs.)	04193500	04291213	–
3 x 9 Reducing, 3 x 4 inch (Weight 15 lbs.)	04197600	04294213	–

DESCRIPTION
Relay output module having 4 S.P.D.T., 10 AMP relays and indicating lights Part No. 40070700
8" Dia. float for liquids having a specific gravity of .45 or more. (An access hole in the tank is required to attach the 8" float to the tube or a 10" flange adapter)

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Series 7230
Continuous Liquid Level Sensors

7230 HT Multivariable Digital Probe

Proven Magnetostrictive Sensing Performance Integrated with a Modbus or ASCII Digital Multivariable Protocol

The 7230 HT Digital Probe is a new magnetostrictive level measurement probe from Ametek APT for the up-stream oil and gas industry where multi-layer and temperature data is critical to everyday operations.

The 7230 Probe is a level measurement solution that provides both total and interface levels as well as temperature readings from up to 5 discreet positions. All the data is collected by installing a single sensor through a single process connection, eliminating the need for multiple sensors and insertion points. The 7230 Series is approved as Explosion Proof (without intrinsic safety barriers) for Class I, Div. 1 and Zone 1 hazardous locations.

The 7230 is available with a choice of either Modbus RTU or ASCII communication protocols. An optional analog interface module is also available for use with the Modbus RTU output. This option allows for multivariable 4-20mA outputs.

All of this performance is enhanced by Ametek APT's patented magnetostrictive design. Magnetostrictive technology requires no calibration yet provides the highest accuracy of any of the most popular level technologies that are currently offered in today's market. The 7230 Probe is no exception, as it exceeds the high accuracy of the proven 7330 Analog STIK with an impressive accuracy of 0.01% of measured span.

Product Features

- Multivariable readings
- Modbus or ASCII Protocol
- High accuracy
- High temperature
- Reliable level measurement
- Material's electrical characteristics and densities do not affect readings
- Easy to install, no technician needed
- Mixed hydrocarbons will not cause level measurement errors
- A variety of floats are available

Specifications		
Enclosure Type	Type 4/4X IP66	Approvals FM (US and Canada) XP Class I, Div I, Group A, B, C, D, T4 DIP Class II, III, Group E, F, G, T4
Output Signal/Protocol	Level, Interface and Temperature 7231: RS-485, Modbus RTU 7235: TTL, Proprietary	
Data	7231: Signed, Long, Binary 7235: ASCII	
Range Temp.	-40°F to 257°F Process -40°F to 158°F Ambient	
Pressure Rating, Wetted Parts	316SS Probe: 1000 psi max. Floats Dependent: Consult Factory.	
Wetted Parts	316LSS	
Probe Length	Up to 24 foot, 21" to 288"	
Accuracy	0.01% of Span	
Power Supply	7231: 10 to 30 VDC 40mA @ 30 VDC max. 26mA @ 24 VDC Typical 7235: 5 VDC, +/-10% Typical 3.7 VDC min. 17mA max.	FM APPROVED
Null Zone	9.25"	
Dead Band	2.75"	
Specifications are subject to change without notice. Patented.		

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AMETEK®
FACTORY AUTOMATION

7230 HT Multivariable Digital Probe

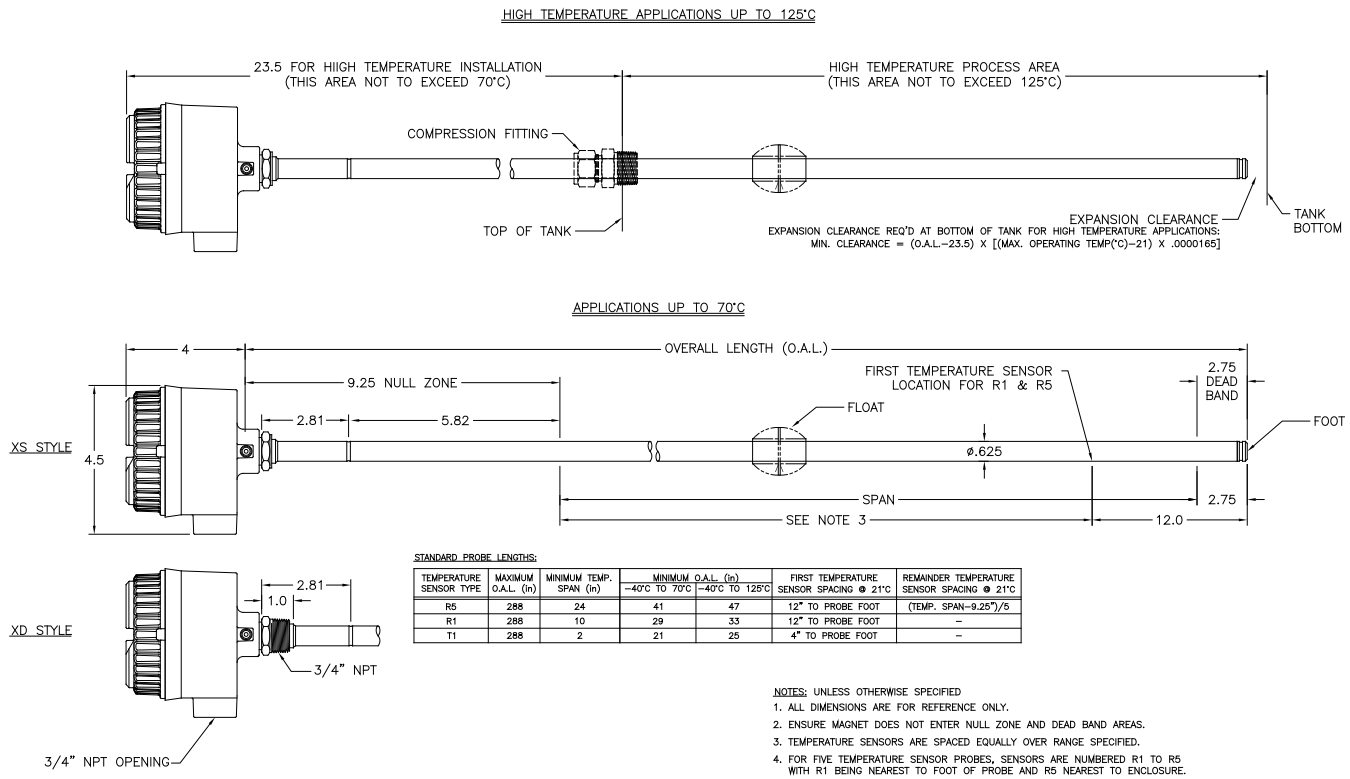
Part Numbering

723 — X — X — X — X — LLL — Rx — Fx — XXX — H — EX

- **723** — **7230 Series HT Digital Probe**
- **X** — **Protocol**
  1 = Modbus
  5 = Proprietary ASCII
- **X** — **Style/Material**
  X = 316 Stainless Steel
- **X** — **Connector Style**
  D = 3/4" NPT Dual
  S = 3/4" NPT Single
- **X** — **Fittings**
  E = English
- **LLL** — **Span***
- **Rx** — **# of Temp Points**
  R1 = 1 Sensor
  R5 = 5 Sensors
  T1 = 1 Sensor
- **Fx** — **# of Floats**
  F1 = 1 Float
  F2 = 2 Floats
- **XXX** — **Overall Length***
- **H** — **Mounting Style**
  H = Condulet
- **EX** — **Special Mounting**
  EX = FM (US & Canada) Explosion Proof

* Specified in whole 1" increments. See Dimension Drawing for ranges.

Dimension Drawing



STANDARD PROBE LENGTHS:

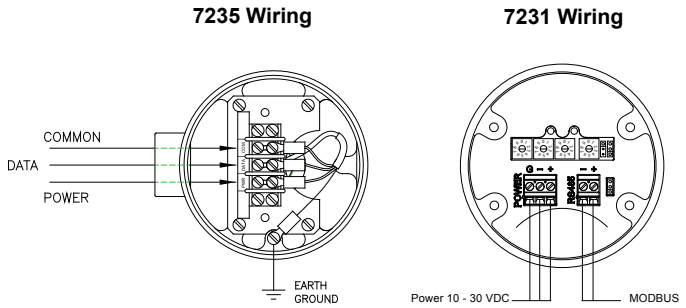
TEMPERATURE SENSOR TYPE	MAXIMUM O.A.L. (in)	MINIMUM TEMP. SPAN (in)	MINIMUM O.A.L. (in) –40°C TO 70°C	MINIMUM O.A.L. (in) –40°C TO 125°C	FIRST TEMPERATURE SENSOR SPACING @ 21°C	REMAINDER TEMPERATURE SENSOR SPACING @ 21°C
R5	288	24	41	47	12" TO PROBE FOOT	(TEMP. SPAN–9.25")/5
R1	288	10	29	33	12" TO PROBE FOOT	–
T1	288	2	21	25	4" TO PROBE FOOT	–

NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL DIMENSIONS ARE FOR REFERENCE ONLY.
2. ENSURE MAGNET DOES NOT ENTER NULL ZONE AND DEAD BAND AREAS.
3. TEMPERATURE SENSORS ARE SPACED EQUALLY OVER RANGE SPECIFIED.
4. FOR FIVE TEMPERATURE SENSOR PROBES, SENSORS ARE NUMBERED R1 TO R5 WITH R1 BEING NEAREST TO FOOT OF PROBE AND R5 NEAREST TO ENCLOSURE.

Accessories

Item	P/N
Float Kit: Level Float, 316SS, 2.05" dia., 0.54sg Float, E-clip & spacer	SD0557200
Float Kit: Interface Float, 316SS, 2.05" dia., 0.96sg Float, E-clip & spacer	SD0556800
Float Kit: Level Float, Nitrophyl 2.0" d x 3.0" h 0.40sg, E-clip & spacer	SD0548600
Float Kit: Interface Float (w/Nitro. level float), 316SS, 2.05" dia., 0.96sg, E-clip & spacer	SD0557300
Adjustable Tube Coupling: 316SS, 5/8" x 3/4" NPT	04283800
Reducing Bushing: 316SS, 2" x 3/4" NPT	04587241
Analog Interface Board: Modbus RTU to analog (4-20mA) converter	04534047

7230 Wiring Diagram



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Series 7330
Continuous Liquid Level Sensors

7330 Series Pro-Stik II Magnetostrictive Sensor with Field Programmable Span

The 7330 Series Pro-Stik II design takes field proven technology and incorporates features including field programmable span. A variety of floats and mounting accessories is also available to fit many applications.

The construction of the sensor has all of the electronics integrated into the 5/8" diameter sensing tube. This breakthrough in package design eliminates the bulky electronics enclosure at the top of the sensor.

7330S & F

7330X

7330V

7330X
The 7330X Pro-Stik II is ideal for level monitoring in a variety of liquids and tanks.

- Mini connector or 3/4" NPT fitting
- Totally welded construction optional
- Cathodic protection optional
- Security feature uses a timing sequence to unlock the probe for programming.

7330V
The 7330V Pro-Stik II is ideal for level monitoring in a variety of liquids and tank designs especially when overhead room is limited. Diagnostic output provides continuous information about the float's position.

Available in flexible and semi-flexible PVDF (polyvinylidene fluoride) in lengths up to 40 ft. PVDF material provides an excellent option for monitoring chemicals not compatible with stainless steel.

7330S & F
The 7330 S & F probe design eliminates unnecessary cracks and crevices and is available in a 3A CIP version with a removable float. The rugged, 316 stainless steel construction is ideal for food processing, pharmaceutical and other sanitary environments.

- Provides continuous absolute position data.
- No calibration required.
- Finish is welded, ground and polished
- Installed with a standard Tri-clamp fitting. Can also be ordered without a Tri-clamp.
- "Timing sequence" unlocks probe, preventing accidental re-programming.
- Diagnostic outputs

Specifications

Operating Voltage	13.5 to 30 VDC	Intrinsically Safe Barrier	See Installation Drawing E0240200 on page 9
Output Operating Output Diagnostic Output	 4 to 20mA 3.9mA and 20.1mA, float outside of span 3.8mA, no signal received (Note: Diagnostic Tolerance +/- 0.02mA)	Enclosure Material Rating	Probe: 316 SS or PVDF IP68
Operating Temperature Hazardous Locations ---------- Non Hazardous Location Sensing Area Electronic Area	 -40°C to 70° C ---------- -40°C to 100° C -40°C to 70° C	Probe Length Stainless Steel R Stainless Steel D, S, M PVDF Style C PVDF Style X	 19" to 288" 18" to 288" * Consult Factory 20" to 192" 25" to 840"
Pressure Rating	316SS Probe: 1000 psi max. PVDF Probe: 150 psi max. Floats: Dependent. Call Factory.	Hazardous Areas Approvals cFMus -40° ≤ Tamb ≥ 70° C Class I, II, III, Div. 1 Groups C, D, E, F, G, T4 Class I, Div. 2 Groups A, B, C, D, T4 Class I, Zone 0, AEx ia IIB T4 ATEX Ex ia IIB T4 FM FM13ATEX0028X (See PVDF installation note) CE 0344 Ex II 1G	
Resolution	0.025% of span or 0.014", (Whichever is Greater)		
Repeatability	0.014" + 0.05% of span typical, 0.014" + 0.4% of span maximum		
Accuracy	0.1% of span or 0.050" (Whichever is Greater)		
Null Zone	8"		
Dead Band	2"		

Specifications are subject to change without notice. Patented.

Accessories

Item	P/N	Item	P/N
7330 V Style		**7330 X Style**	
Float: 316 Stainless Steel,2.05" dia., 0.56s.g.	14020002	Float Kit, 316 SS, 2.05" Diameter w/ E Clip and Spacer 0.54s.g.	SD0515000
Weight Kit: for use with PVDF probes with OAL of 146" to 288" 316 Stainless Steel components, 2"d x 7"h weight and retaining pin. (For use with "X" style mounting).	SD0517408	Float Kit, Nitrophyl, 2.02" Diameter w/ E Clip and Spacer 0.40s.g.	SD0536500
Weight Kit: for use with PVDF probes with OAL of 289" to 432" 316 Stainless Steel components, 2"d x 7"h weight and retaining pin. (For use with "X" style mounting).	SD0517411	Cable Assembly, 4 pin, 6 feet long (M style only)	01533141
Weight Kit: for use with PVDF probes with OAL of 433" to 480" 316 Stainless Steel components, 2"d x 7"h weight and retaining pin. (For use with "X" style mounting).	SD0517413	Adjustable Tube Coupling 5/8" x 3/4" NPT	04283800
Float Spacer: PVDF split ring spacer and screws. (For use with "C" style mounting).	SD0511000	Junction Box, side mount, explosion proof with zero & span push buttons	SD0536101
7330 S & F Styles		Safety Barrier Single Channel	04517238
Cable/Connector Ass'y, 6 ft., M Style	01533141	Safety Barrier Dual Channel	04517248
Meter, 4.5 Digital Display, Panel Mount, 2 Output Relays	04541069	Meter, 4 1/2 digit display, panel mount, 2 output relays	04541069
Sanitary Float Kit, 316SS, 1.83" dia., .61s.g., F Style Only	SD0529100	Bushing, 3/4" x 2" NPT 316SS	04587241

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AMETEK®
FACTORY AUTOMATION

Part Numbering

733 — X — X — X — X — LLL — Fx — XXX — X — XX

7330 Pro-Stik II

Output
0 = 4 to 20mA
1 = 20 to 4mA

Connector Style
M = Mini
R = 1/2" NPT Right Angle
D = 3/4" NPT Dual
S = 3/4" NPT Single (Steel)
1/2" NPT Single (PVDF)
B = Fixed Bottom

Fittings
E = English

Span*

# of Floats
F1 = 1 Float

Overall Length*

* Specified in whole 1" increments.
See Data Sheet for ranges.

Style/Material
X = 316 Stainless Steel
V = PVDF
S = Sanitary (3A Approved)
F = Food Grade

High Temp. Applications
(NOT APPROVED for use in Hazardous Areas)
A = 316 Stainless Steel
B = Sanitary (3A Approved)
C = Food Grade

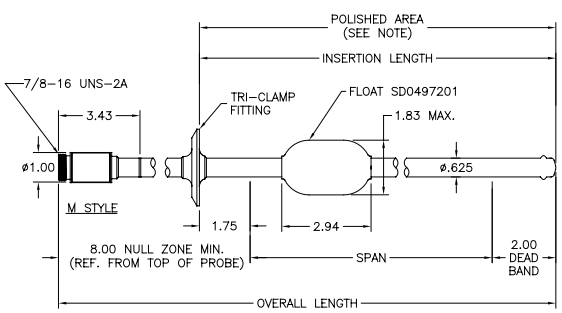
Mounting Style
X = None
C = "C" Version
T = Tri-Clamp
B = Fixed Bottom
P = C.I.P. (3A)

Special Mounting
XX = None

For B Mounting Style
Sx = Stainless Hsg
Cx = CPVC Hsg *
x0 = Std

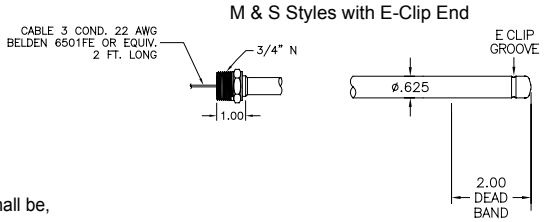
For T & P Mounting Style
20 = 2"
25 = 2.5"
30 = 3"
40 = 4"

7330 S & F Dimensions



M & S Styles with CIP End

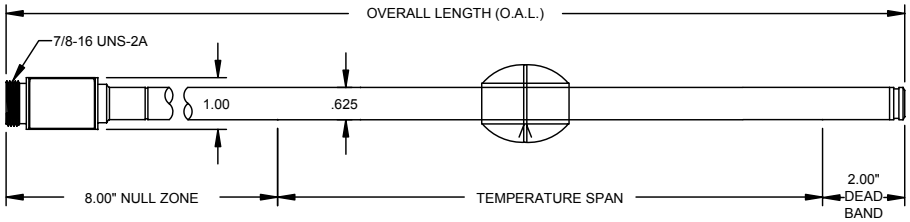
M & S Styles with E-Clip End



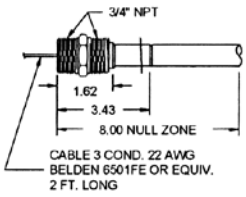
Note: All polished area surfaces shall be,
a) 180 grit or better for Food Grade,
b) 240 grit or better for 3A Sanitary.

7330 X Dimensions

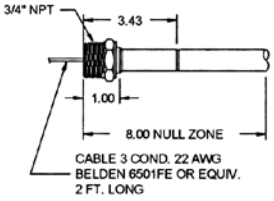
M Connector



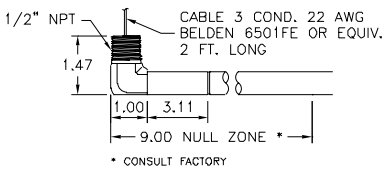
XD STYLE



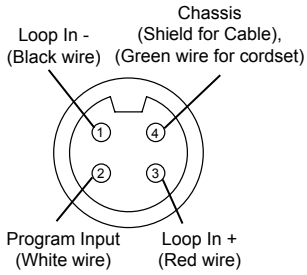
XS STYLE



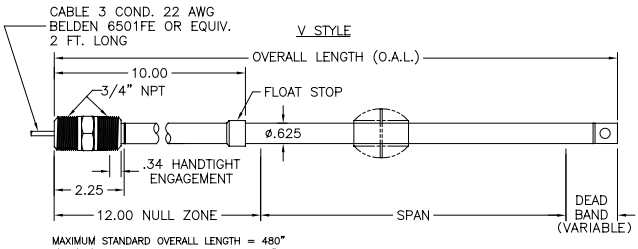
XR STYLE



Wiring Diagram For 7330 X, S & F



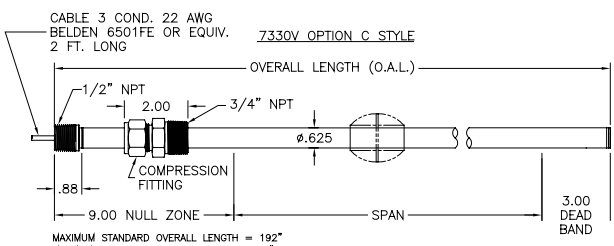
7330 V Dimensions



MAXIMUM STANDARD OVERALL LENGTH = 480"
MINIMUM STANDARD OVERALL LENGTH = 25"

EXPANSION CLEARANCE REQ'D AT BOTTOM OF TANK (V STYLE):
MIN. CLEARANCE = (O.A.L.) X (MAX. OPERATING TEMP(°C) – 20) X (.00014)
OVERALL LENGTH = INSERTION LENGTH – CLEARANCE + 1"

O.A.L. (in)	DEAD BAND(in)	CLEARANCE(in)
25–144	6.00	1.00
145–288	8.00	2.00
289–432	12.00	3.00
433–480	14.00	4.00



MAXIMUM STANDARD OVERALL LENGTH = 192"
MINIMUM STANDARD OVERALL LENGTH = 20"

NOTES: UNLESS OTHERWISE SPECIFIED
1. OPERATING TEMPERATURE OF V–C STYLE PROBE IS 0–40°C (32–104°F)
2. ALL DIMENSIONS ARE FOR REFERENCE ONLY.

Wiring Diagram For 7330 V

Signal Name	Pigtail Cable
Loop (-)	Black
Prgm Input	White
Loop (+)	Red

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Series 7330
Continuous Liquid Level Sensors

Explosion Proof Magnetostrictive Sensor with Field Programmable Span

The 7330 EX/ED Series Pro-Stik II takes field proven magnetostrictive sensing technology and incorporates features such as a field programmable span. This is packaged in our patented Stik design, making the Pro-Stik II ideal for level monitoring in a variety of liquids and tanks. Sensors are available in rigid 316 stainless steel up to 24 feet.

This stainless steel version is available with a 3/4" NPT fitting joined to a housing with terminal connectors and zero/span push-buttons. The stainless steel version offers a totally welded construction and may be provided with cathodic protection.

The sensor's electronics are SMT components in a 5/8" diameter sensing tube. This packaging breakthrough eliminates the electronics enclosure at the top of the sensor, improving the environmental seal and offering greater options for insertion and mounting in tanks and vessels.

The 7330 EX Series Pro-Stik II is a loop powered explosion proof sensor with a scalable 4 to 20mA span that provides 0.1% accuracy, full scale. The only calibration required is to set the upper and lower limits of the span.

The probe provides a security feature by utilizing a timing sequence that is used to unlock the probe for programming. This ensures that the span cannot be accidentally programmed by someone in the field.

The unique diagnostic output provides continuous information about the float's position and passcode protection for programming.

The sensor can be "bench" calibrated to set the zero and span or an optional housing with push-button setting of the zero and span at the tank is available.

If The float is...	Output
Below set span, but within active region	3.9mA
Above set span, but within active region	20.1mA
Either above or below active range or signal is lost	3.8mA

A variety of floats and mounting accessories are available to fit virtually any application. Speak with an Applications Engineer to discuss your needs today. Call 800.635.0289 or visit us online at www.ametekapt.com.

Specifications			
Operating Voltage	13.5 to 30 VDC	Probe Length Stainless Steel D, S	18" to 288" * Consult Factory
Output Operating Output Diagnostic Output	4 to 20mA 3.9mA and 20.1mA, float outside of span 3.8mA, no signal received (Note: Diagnostic Tolerance +/- 0.02mA)	Approvals FM (US & Canada) XP Class I, Div I, Group A, B, C, D, T4 DIP Class II, III, Group E, F, G, T4	
Operating Temperature	-40° to 70° C, (-40° to 158° F)		
Pressure Rating	316SS Probe: 1000 psi max. Float Dependent. Consult Factory.		
Resolution	0.025% of span or 0.014" (Whichever is Greater)		
Repeatability	0.014" + 0.05% of span typical, 0.014" + 0.4% of span maximum		
Accuracy	0.1% of span or 0.050" (Whichever is Greater)		
Null Zone	8"		
Dead Band	2"		
Enclosure Material Rating	Probe: 316 SS IP68		
Specifications are subject to change without notice. Patented.			

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Part Numbering

733 — 0 — X — D — E — XXX — F1 — XXX — H — XX

7330 Pro-Stik II

Output
0 = 4 to 20mA
1 = 20 to 4mA

Style/Material
X = 316 Stainless Steel

Connector Style
D = 3/4" NPT Dual
S = 3/4" NPT Single

Fittings
E = English

Span*

# of Floats
F1 = 1 Float

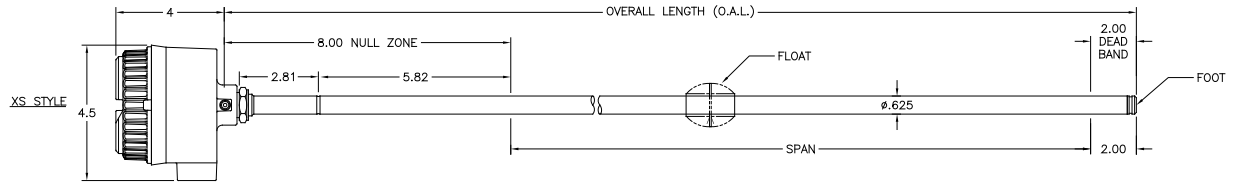
Overall Length*

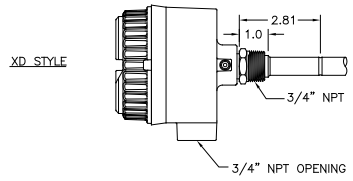
Mounting Style
H = Condulet

Special Mounting
EX = FM (US & Canada) Explosion Proof

* Specified in whole 1" increments.
See Specifications for ranges.

Dimension Drawing





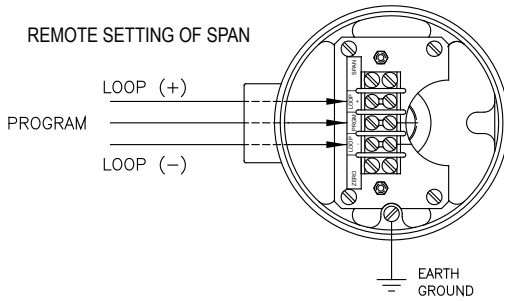
MAXIMUM STANDARD OVERALL LENGTH = 288"
MINIMUM STANDARD OVERALL LENGTH = 18"

NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL DIMENSIONS ARE FOR REFERENCE ONLY.
2. ENSURE MAGNET DOES NOT ENTER NULL ZONE AND DEAD BAND AREAS.

Accessories

Item	Part Number
Float Kit, 316 SS, 2.05" Diameter w/ E Clip and Spacer 0.54s.g.	SD0515000
Float Kit, Nitrophyl, 2.02" Diameter w/ E Clip and Spacer 0.40s.g.	SD0536500
Cable Assembly, 4 pin, 6 feet long (M style only)	01533141
Adjustable Tube Coupling 5/8" x 3/4" NPT	04283800
Meter, 4 1/2 digit display, panel mount, 2 output relays	04541069
Bushing, 3/4" x 2" NPT 316SS	04587241

Wiring Diagram



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Series 8040/8041
Control Panels: *Consult Factory for Additional Details*

ALARM PANELS

B/W Signal and Alarm panels are available in many standard packaged units designed for use in a wide range of high, low and intermediate level alarm applications as well as for remote control signalling. Each contains the proper B/W level sensing relays and operates from electrodes set at desired alarm levels.

These panels can also be furnished with one or more B/W pump control relays included in the package to perform any desired level control function. Also, these alarm systems can be incorporated into any of the other control systems shown in this catalog.
Contact us for assistance to meet your specific needs.

FIXED SEQUENCEY PANELS

These arrangements minimize installation time and costs by combining 2 or 3 control functions into a single control panel. All wiring connections between the B/W relays are made in our shop. Field wiring is made to the rugged terminals of the B/W relays and a system wiring diagram is provided which clearly shows all required external connections to the electrodes and other devices.

The standard enclosure is rated NEMA 3R for location indoors or outdoors. It is made of steel with baked enamel finish and has knockouts in the bottom for conduit fittings. The NEMA 4 watertight enclosure is fiberglass. It meets the NEMA 4X corrosion resistance standards and suitable aluminum conduit hubs are furnished as open chassis on a back plate for field mounting into an electrical panel.

Several of the most common control combinations are listed below and identified with catalog numbers. However, any combination of relays can be provided.
Just tell us what you want.

AUTOMATIC ALTERNATOR PANELS

A basic pump down control used on systems for storm drainage condensate return, septic tank effluent, swage lift stations, water soluble machine tool coolants, and cooling tower sumps.

While any of the B/W relays can be furnished, the Type 1500 induction relays are indicated. These have heavy load contacts that are capable of directly operating single phase pumps up to 1 H.P. @ 120 or 240 Volts A.C., or up to size 5 motor starter coils.

The Model AD2C for pump down (or AU2C for pump up has a common power supply through the B/W panel to energize the pump control circuits. For many applications it is desirable to have the pump, motors, and/or their motor starters on their own power supplies. For these situations Model AD2I for pump down or AU2I for pump up) has an isolated load contact for each pump control circuit and should be used. B/W Alternators are compact packaged units designed to provide automatic change in the operating sequence of any number of pumps on either “pump down” or “pump up” level control applications. They provide uniform usage of all pumps under normal operating conditions, yet permit use of full pumping capacity during peak load periods.

HYDROPNEUMATIC TANK PANELS

B/W hydropneumatic tank control systems provide simple, positive means of maintaining a properly balanced relationship between the water level and air pressure in house tanks for large and small buildings, subdivision water supplies, and other installations that require reliable, trouble free operation. Fully automatic on start up, it requires little or no maintenance and minimizes short pump cycling during high demand periods

SOLID STATE ALARM PANELS

VERSATILE NEW ALARM DETECTS MOISTURE, LEAKS AND HIGH LEVELS, PLUS OFF-NORMAL CONDITIONS INVOLVING A WIDE VARIETY OF PROCESS VARIABLES AND BUILDING SECURITY APPLICATIONS.

B/W Series 8041 Solid-State alarm systems are designed to provide new versatility, safety and reliability in monitoring and detecting off-normal conditions in a broad range of industrial, commercial and institutional applications.

OPERATING FEATURES AND ADVANTAGES

B/W Series 8041 Alarm Systems also provide field - adjustable sensitivity from 1000 ohms up to 1 megohm to assure reliable operation over long distances and in detecting leaks or high levels of a wide variety of conductive liquids. A field adjustable time-delay is also provided to eliminate false trips due to liquid turbulence or electrical transients. The alarm action does not start until the time delay is completed.

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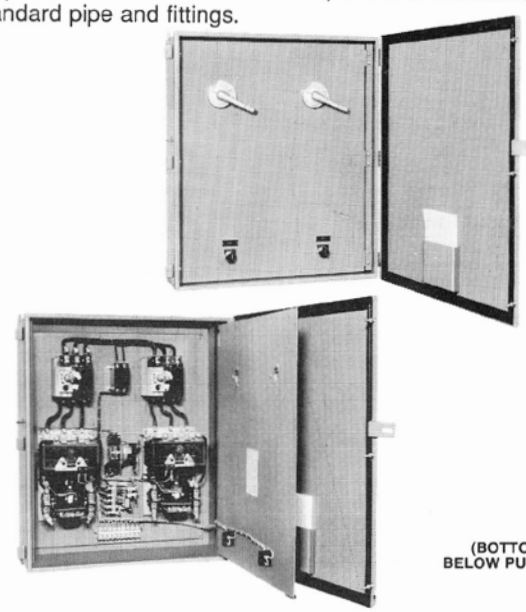
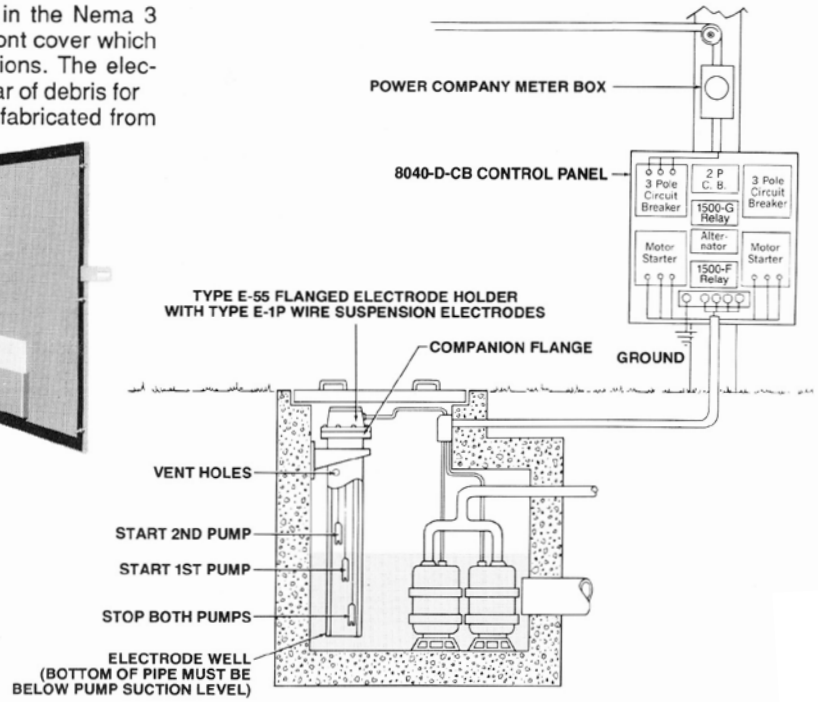
CUSTOM CONTROL PANELS

Control Panels can be built to customer specifications. Modification to alarm, fixed sequence, and alternation control panels can be designed by AMETEK APT to meet the needs of each customer.
Consult the factory for additional details.

TYPICAL STORM DRAIN SUMP CONTROL

Model 8040-D-C3B control panel is shown in the Nema 3 weather tight enclosure with internal dead front cover which is designed for unattended outdoor installations. The electrode will serve to keep the liquid surface clear of debris for proper contact with the electrodes, and it is fabricated from standard pipe and fittings.





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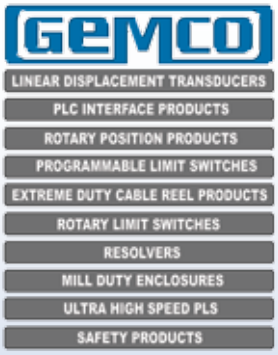
Other Products



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